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CONTENTS

EDITORIAL:
Editorial Notes 171
Government Control of Safety Appliances 171
High Speed and Heavy Rolling Equipment 172
The New York Central and Western Maryland 173
New Books 174

LETTERS TO THE EDITOR 175

ILLUSTRATED:
Buenos Ayres & Pacific 177
Tractive Power of Simple and Compound Locomotives 179
Economical Wood Preservation 182
Harlem River Branch Improvements, N. Y., N. H. & Hartford 186
Government Railway Control in Mexico 193

MISCELLANEOUS:
Car Interchange at Niagara Frontier 177
Locomotive Boiler Practice in Foreign Countries 180
Discussion of Hine System of Organization 181
The Development of Canada 184
Comments on the Electric Railway Situation 185
Transportation and Traffic in Belgium 190

GENERAL NEWS SECTION 195

SUPPLY TRADE SECTION 212

The government signal board has made an elaborate report on an automatic train stop, and the substance of it is printed in this issue. Proprietors of devices of this class have spent their money, many of them large sums, in the expectation that the railways will need to use automatic apparatus extensively to prevent those collisions which are due to enginemen's carelessness, or else that Congress will compel such use. Thus far both of these expectations have proved groundless; and there are still no signs of a change. The apparatus described in another column is shown, not because it is now of more interest than it has been during the past 15 years, but because it is the text on which is based a careful and intelligent report on the general subject of automatic train stops. The Railway Signal Association has grappled with this subject as an academic question and has produced only a set of requisites which are so rigid as to exclude every known plan. This leaves the impression that the association does not want anything to do with automatic stops—which is not far from correct. The government board presents its theories with equal or greater rigidity—but has the sense to call them desirable, instead of necessary, and concludes with a cautious and qualified approval of a mechanically operated stop which is installed in duplicate in such a way that a failure of the apparatus is pretty sure to stop the train. In calling the board's approval "qualified" we do not refer particularly to the faults in principle or design which are mentioned in the report, for these can be corrected; but severe and long continued corrective treatment is necessary for inventions that have to do with high-speed railway operation. The clause, "well inspected and maintained," is the vital qualification. Excellent and costly inspection and maintenance have made the apparatus successful in the Interborough subway, but the belief that such a standard of up keep is not practicable under ordinary "out door" railway conditions is one of the main elements in the universal disinclination among railway men to use automatic stops.

The recent washout on the San Pedro, Los Angeles & Salt Lake took out substantially all the track on the main line between Acoma, Nev., and Rox, about 90 miles. The line here is in the Meadow Valley wash, which for the greater part of the year is dry or carries a very small stream. It is for the most part canyon, but the valley widens at certain points and in these bottom lands the stream does not keep to its channel. The drainage area is large, and there is high land at each side. The recent flood is the third in five years. In 1905 traffic was blocked for two weeks, and in 1907 six weeks. Both of these came at the end of the winter when the snow melted. There were no cloudbursts. After the 1907 washout the line was rebuilt. It was put, supposedly, out of reach of ordinary flood water, steel bridges were erected and about $1,000,000 was spent in riprap. This year the water came at an unprecedented time and its volume is estimated as being five times as much as in 1907. There had been heavy snow, and during the last days of December there was a warm rain. As the ground was frozen, all the water came down into the wash, none of it soaking in. The stream began to rise on New Year's eve and on the next day telegraphic communication was broken. The water stayed up for several days, being 12 ft. deep over the tracks at places. The current was so swift that it took out bridges, track and embankment bodily; between the two points mentioned there are only a few short stretches of track left. The water rose comparatively slowly. There was no loss of life at the ranches in the bottom lands, but one track-walker was killed. An eastbound passenger train was caught at Eccles and the passengers were taken out on wagons. Near Caliente, a few miles west of Eccles, a 26-car freight train was caught and the track was later washed out from under it and the train ditched. Cars were also caught in the Caliente yards. About 130 freight cars, which were en route when the washout occurred are being detoured via the Southern Pacific, the Tonopah & Goldfield and the Las Vegas & Tonopah. No further arrangements for through business have been made. Eastbound traffic originating on the western part of the line will, presumably, be turned over to the Southern Pacific and the Santa Fe. Local trains are being operated on the lines east and west of the washout. A locating party is already in the field locating a new line. It cannot be built in less than six months or a year.

GOVERNMENT CONTROL OF SAFETY APPLIANCES.

A bill is now before Congress which proposes to hand over to the Interstate Commerce Commission control of the mechanical details of the safety appliances on cars.

During the many years in which Secretary Moseley was invited to address the Master Car Builders Association at its annual meeting there was one refrain which ran through all that he had to say. It was that the master car builders constituted the court of final appeal for everything pertaining to the construction and maintenance of a car, and that the whole effort of the commission was to strengthen the position of the association and to insure the adoption of such standards as

it might adopt. The commission's action, thus far, has been quite in accord with these protests. It has had laws enacted providing, for example, for the application of automatic couplers and air brakes, but it has not had the hardihood to specify that the couplers should be of the Janney type, or to mention the name of Westinghouse in any of its statutes. Very properly, it has left these things to men who were skilled in the art, merely requiring that their construction should comply with certain requirements. Couplers could be placed on car corners or on the roof, for all the law cared; it was simply necessary that they should be automatic in their action. Nor has strength been so much as hinted at.

The commission's advocacy and support of the M. C. B. standards has been based upon the desirability of uniformity, which is accepted by every railway officer in the land. It is because of this fact that the present standards have been adopted. According to the report of the proceedings of the Master Car Builders' Association, the history of the adoption of the safety appliances is this:

"In 1893 a recommended practice was adopted on safety appliances under the subheads given. In 1896 some changes were made, especially in regard to handholds, and by the elimination of various details from the drawing. In 1902 it was changed to standard.

"In 1905 sheet M. C. B. 19 was revised to define more clearly the location of safety appliances on cars. Also, the lower round of the end ladder with wooden rails was made straight instead of having an offset.

"In 1906 the position of the brakeshaft and location of the roof handholds were modified.

"In 1907 sheet 19 was devoted entirely to illustrating these standards.

"In 1908 a thorough revision was made of both text and drawings in order to make their meaning and intent clear and adaptable to all existing types of car equipment, and to be capable of but one interpretation."

Of course the commission does not believe that the final word has been said; that no future change will be found desirable, and that a year's trial has been sufficient to demonstrate this and to warrant crystalizing the present safety appliance rules into statute, from which there can be no change except through the slow process of an appeal to the commission. What is to be gained by the proposed legislation, then? A non-technical commission could not possibly specify any dimensions for safety appliance locations on its own initiative. It would have to rest on the judgment and experience of the car builders in any case. Consequently, there is no obvious gain to be derived from a law compelling the railways to do what they are already doing.

If the value of the proposed law is nebulous, however, the harm and danger of it should be apparent to all. In the first place, it proposes to vest technical responsibility in a non-technical body; a process which naturally results in hindrance to changes in the direction of progress. In the second place, it means that the initiative of changes would rest largely with the inspectors—and the commission has never yet been able to forget political considerations in appointing these agents, who ought to be unimpeachably beyond the reach of outside influences. In practice, inspectors are now nominated by the labor unions and ratified by the commission; every extension of the inspectors' power is therefore clearly against public policy, since the unions are interested neither in the safety of the traveler nor in the team work of their own members for purposes of efficient railway operation. The labor union is very glad to supply the commission with safety appliance inspectors; in case of labor trouble with individual roads the union inspector has in his power tremendous weapons for delay and annoyance, since he is enforcing a statute resting on the observance of technical requirements, of which he is, in effect, the sole judge.

Our position should be understood in this matter. We believe the government can, and ought to, increase the safety of travel by investigating railway accidents automatically, of its own initiative, but we believe the investigation should be done by army officers, since this is the only apparent method of getting discipline enforced against the negligent employee as well as against the negligent corporation. We believe that the national habit of taking chances has more to do with our appalling accident record than any other contributory cause, and that this chance-taking can usually be brought straight home to engineman, brakeman, flagman, despatcher or operator. But a corps of labor-union inspectors, whether engaged in inspecting accidents that have happened, or safety appliances intended to safeguard the individual employee, will find some way of laying responsibility on the corporation, always; on the employee, never. The need for better safety in American railway working is so grave, and the methods of bringing it about are now so well understood, that every effort to introduce politics, the evil of the democracy, into government inspection ought to be resisted sturdily. Yet the bill to give the commission control of the mechanical details of the safety appliances on cars is largely a political measure.

HIGH SPEED AND HEAVY ROLLING EQUIPMENT.

A valued correspondent in Paris, who is the technical representative of one of our locomotive companies, has written in regard to the editorial on "Limited Speed of Passenger Locomotives" in our issue of December 24, 1909, and we publish his letter on another page. Mr. Fry first takes exception to the statement that "our best locomotive will not haul a train of six modern cars at speeds much above 60 miles per hour," and thinks we do less than justice to the steam locomotive. The statement may come as a surprise to those living abroad who have not taken account of the large increase in weight of American passenger equipment in recent years, and who still regard a coach weighing 25 or 30 tons and Pullman cars weighing 43 tons as representative of present practice. The editorial referred to the speed of trains composed of modern American steel cars, while our correspondent's speed references relate to fast runs with equipment used 12 years ago, in 1898.

We have before us the weights of the cars and locomotive used in the Atlantic City run which he mentions, and they are as follows:

1 combination car	57,200 lbs.	
4 coaches, each 59,200 lbs.	236,800 "	
1 Pullman car	85,500 "	
Total, 6 cars	379,500 lbs.	= 189.75 tons.
Atlantic locomotive	227,000 "	= 113.50 "
	606,500 lbs.	= 303.25 tons.

In contrast with this we mention the fact that new steel coaches with wood inside finish just received by one of the Chicago lines weigh 139,000 lbs. New buffet library cars for another western line weigh 153,000 lbs. In the design for new sleepers for the Pennsylvania it is difficult to limit the weight to 160,000 lbs., and 75 to 80 tons may be taken as the weight of modern sleeping cars. The 70-ft. steel coaches which are being built in large numbers, are so heavy that it is necessary to use six-wheel trucks under them, and these alone weigh over 40,000 lbs. for two trucks.

This increase in weight of passenger cars and the large number of cars in a train has resulted in the use of the Pacific locomotive with six coupled wheels in place of the Atlantic type with four coupled wheels. The latter engine is better suited to high speed service than the former, but it cannot accelerate heavy trains to running speed nor maintain speed on grades as well as the Pacific. The internal friction of the Pacific engine is much greater than that of the Atlantic, and it reaches its speed limit sooner. This larger and more powerful locomotive has not enabled our railway managers to materially increase the speed of limited trains or give us a real

high speed service. The average scheduled speed of New York Central's 18-hour train, New York, to Chicago, is 53.5 miles per hour, including stops, and of the Pennsylvania's 18-hour train between the same points, 50.6 miles per hour, including stops.

A train was recently made up for test purposes which was intended to represent modern express equipment which could be hauled at high speed on level track. The six cars weighed 350 tons and the Pacific locomotive 194 tons, total 545 tons. It will be seen that the weight of these six cars is nearly twice as great as that of the six cars on the Atlantic City run reported by Mr. Fry, and the locomotive weighs 63 per cent. more than the Atlantic, which was used in the 1898 test. The writer rode on the heavy six-car train weighing 350 tons when an effort was made to attain high speed, but the Pacific locomotive, which was selected for its good record on that line, was not able to accelerate the train to more than a fraction above 60 miles per hour on a straight level track where atmospheric conditions were normal. This actual experience under the most favorable conditions seemed to warrant the statement referring to the limited speed of passenger locomotive to which Mr. Fry has taken exception.

His letter says that many other portions of the article are highly debatable. This may be true, and if so, let us debate them. Most questions about locomotive operation are debatable; if they were not, our business would not be interesting and progress might cease. We purposely made our statements strong to see if they would stand without a protest, and with the hope that protest might enlighten. If we debate them let us do it with the purpose of stimulating improvement by suggestion and not simply to show who is right and who is wrong. The one example of a debatable statement cited by Mr. Fry is "that with a balanced compound with only one valve for two cylinders the steam distribution is less satisfactory than on the Euporean type with a valve for each cylinder." This statement had reference to four-cylinder engines for high speed service, where, we believe, there must me an advantage gained in large port area obtained by four valves for the admission and exhaust of steam at high velocity, for with such large boilers and ample steam supply the only apparent reason for limited speed is the contraction of the valve opening at high velocity, and whichever arrangement provides the largest port area at a given speed must be most satisfactory. If a single valve can be made to provide as large a port area at short cut-off as two valves and work satisfactorily, then it is to be preferred on account of its simplicity. After a long and large experience with four valves on four-cylinder engines by the French railways, we believe the latest designs retain them. This is seen in the new Pacific locomotive for the Western Railway of France, which was fully illustrated in our issue of December 10, 1909, page 1144. In this instance the inside valves are driven by the outside valve gear and the complication due to inside eccentrics and valve gear is avoided. The new Pacific four-cylinder locomotives for the Paris, Lyons & Mediterranean, illustrated in our issue of January 7, 1910, page 23, have four valves and they must have some good purpose or they would not be retained.

Finally, our correspondent refers to the remarkably high speed reported for the new three-cylinder simple locomotive on the Atlantic City division of the Reading. While no official records of the performance of this locomotive have been made public, it is understood that its speed performance exceeds that of the other locomotives now in that service. The fact that this locomotive was designed and built by the Reading at its own shops is in itself an expression of that protest against the self-satisfaction and lack of enterprise on the part of locomotive builders which is manifest in their failure to produce a locomotive which will haul modern passenger trains at high speeds, that is, exceeding 65 or 70 miles per hour. Surely they are not keeping pace with the rapid progress so characteristic of the present times when it is necessary to go back 12 years to find a record of creditable high speed performance.

On several railways in the West it was for a time thought that it would be necessary to electrify the mountain divisions in order to attain speeds which would carry the large volume of traffic over the grades and avoid congestion and blockade. The Mallet locomotives have overcome this difficulty and their remarkable performance has for the time rendered the electric locomotive on mountain lines, where there are no long tunnels, unnecessary. There is, we believe, a general feeling that for faster schedules in passenger service the electric locomotive will be necessary. Cannot locomotive builders again rise to the occasion and make some radical improvement in the passenger locomotive which will better adapt it to high speed service, or must we conclude that the steam locomotive has about reached its limit of speed in dealing with heavy express trains? The only change that is being made from year to year is an increase in size of the boiler and the cylinders and the use of four cylinders instead of two, but it has no new device to adapt it to higher speeds. The engine is made larger and heavier and it has become so large and heavy that at 60 miles per hour a large proportion of its power is expended in driving itself. There is no improvement in valve gear or steam passages having special reference to high speed work. These enormous locomotives are really fast freight engines with a capacity to haul heavy trains, but not at high speed.

We suggest, therefore, that if this discussion is to continue the concrete question be considered, "What can be done to so improve a locomotive which reaches its limit of speed of 60 miles per hour on straight level track that it will haul the same train at 70 miles per hour?" In our editorial we suggested several methods which might accomplish the purpose. Some of them may be regarded as unpractical or visionary; perhaps they are so; but they will amply serve their purpose if they stimulate others to think of some means for the purpose which will be practical and successful.

NEW YORK CENTRAL AND WESTERN MARYLAND.

The traffic agreement for 99 years, which has been made between the Western Maryland and the Pittsburgh & Lake Erie, controlled by the Lake Shore & Michigan Southern, provides for the immediate building of a line from Cumberland, on the Western Maryland, to Connellsville, the southern terminus of the Pittsburgh & Lake Erie. With this connecnection built, the New York Central will be in a strong position to compete with the Baltimore & Ohio for western business from Baltimore and on export freight business to the port of Baltimore. It will give the New York Central three of the most important ports on the Atlantic—New York, Boston and Baltimore.

The Western Maryland when it went into the hands of a receiver in March, 1908, was a Gould property, separated from the other Gould properties by over 100 miles of country, through which it would have been extremely expensive to build, and moreover it was a property very heavily capitalized. The company was taken out of the hands of the receiver last December. The capitalization of the reorganized company was still high for a road which could depend only on the development of local traffic and on coal traffic in a highly competitive territory.

The plan of the reorganization committee called for the issue of $33,959,560 stock and left outstanding $50,951,950 bonds and funded debt. This on the owned and leased mileage, as given in the 1907 annual report, was at the rate of about $94,000 of funded debt per mile and $63,000 stock per mile. The annual fixed charges call for $2,184,598, or about $4,000 a mile.

By the present agreement the management of the Western Maryland apparently have definitely recognized the undesirability of developing the road only as a local property, and they

have apparently decided that the difficulties of making a connection with the other Gould roads were so great that it was more expedient to make an alliance with some other railway interest. By making this alliance with the New York Central the natural disposition of the Gould roads to compete with the Pennsylvania and the Baltimore & Ohio is given a new turn.

That the new alliance will create keen competition, especially with the Baltimore & Ohio, is apparent from a glance at a map.

The Western Maryland runs from Baltimore to the Elkins coal fields of West Virginia, via Cumberland. It reaches Cherry Run by a route which carries it up as far north as the Pennsylvania state line. The Baltimore & Ohio, on the other hand, reaches Cherry Run via Washington, D. C., so that the roads serve different local territories between Baltimore and Cherry Run. From Cherry Run to Cumberland the two roads directly parallel each other, the Western Maryland running most of the way on the north bank of the Potomac river and the B. & O. for the most part on the southern bank. The B. & O. divides at Cumberland, one line running north through Pittsburgh to Chicago, the other west to Cincinnati. From Cumberland to Connellsville via the Baltimore & Ohio it is 93 miles. The country is mountainous for the most part, and the Baltimore & Ohio's route is by no means an air line. From Connellsville to Pittsburgh the Pittsburgh & Lake Erie parallels the Baltimore & Ohio closely. After leaving Pittsburgh the Pittsburgh & Lake Erie runs north to Youngstown, Pa., where it connects with the Lake Shore & Michigan Southern.

The great preponderence of freight on the Baltimore & Ohio between Cumberland and Baltimore moves east and a good part of it is coal. The westbound traffic on the Baltimore & Ohio consists largely of merchandise freight, limestone and oysters. It will be noted that this traffic, with the exception of the limestone, is fast freight, the oysters being handled in solid fast trains. The Western Maryland should be able to bid for this freight, routing it over the Western Maryland, the Pittsburgh & Lake Erie and the Lake Shore & Michigan Southern. Previously the Western Maryland has been turning a large part of its westbound freight over to the B. & O. at Cumberland.

There will probably not be any great amount of ore shipped down from the lakes over the Pittsburgh & Lake Erie and Western Maryland, because the New York Central already has lines over which it can ship this ore to tidewater, and on which the grades are probably less than will be those of the new line. On the other hand it appears quite likely that the P. & L. E. will turn over to the W. M. considerable quantities of its coal destined for tidewater, and also considerable export freight. It may be recalled that the Chesapeake & Ohio at one time had a line of steamers running from Newport News to Europe (though we believe it was never very profitable), and it is conceivable that the Western Maryland might try some like experiment from Baltimore, but as yet it is understood that no definite plans have been made for such a line. By being able to solicit import freight destined for all points on the New York Central lines, the Western Maryland probably hopes to develop considerable import traffic. The advantages to the City of Baltimore of the development of both this import and export traffic by the Western Maryland should be considerable.

From a financial standpoint, the announcement of the traffic agreement and the immediate extension of the Western Maryland some 80 or 90 miles through heavy country where construction costs may reach as high as $75,000 or $100,000 per mile, leads to speculation as to where the money will come from to build this line. The Western Maryland's first mortgage, under which there are $42,500,000 bonds outstanding, is really a closed mortgage, because the further issue of bonds is reserved to retire prior liens. The Western Maryland had a second mortgage before reorganization but preferred stock was substituted for it. The new line will probably have to be financed by making a mortgage on the line to be built. This is frequently done, especially in cases where the parent road is in a strong financial position and can lend a construction company the money necessary for building and reimburse itself by the sale of bonds after the new line has been completed. It appears unlikely that the Western Maryland can raise the cash necessary for building without the resort to some sort of short term notes, and it speaks well, indeed, for the faith of bankers in the earning power of the Western Maryland if it can raise five or six million dollars so soon after reorganization on short term notes. The reorganization plan was underwritten by Blair & Co., New York, and they undertook to furnish any part of the $8,000,000 cash necessary for the carrying through of the reorganization plan that was not subscribed by stockholders in the old company.

The Western Maryland has been often spoken of as a Standard Oil property as well as a Gould property. The making of a strong traffic agreement with the New York Central's Pittsburgh & Lake Erie would in itself be a great help toward persuading bankers to advance the necessary money, even if the Pittsburgh & Lake Erie does nothing itself toward helping to build the new line; and this does not mean to imply that there has been any suggestion on the part of the New York Central interests that they do intend to help in any way in building the new line.

NEW BOOKS.

Elements of Machine Design. By Dexter S. Kimball and John H. Barr. New York: John Wiley & Sons. 446 pages; 6 in. by 9 in.; 196 illustrations. Cloth. Price, $3.00.

The authors of this book are, or were, professors of machine design at Cornell University, and it is the outgrowth of their work with the students. The first three chapters are devoted to the theoretical and mathmetical discussion of the subject in which the general principles are laid down. In this there is no attempt at special applications of design, nor in fact is there throughout the book as it is a treatise by which the student is to be grounded in methods and principles. This is not taken as meaning that there is nothing to show how these principles should be applied, for in every case there is an example showing in outline how the theory and practice are brought together.

With the fourth chapter we are introduced to what might be called the details of design in the consideration of friction, lubrication and efficiency. The method of treating this topic may be taken as an example of all. First, there is a discussion of the general principles of friction with the effects of projected areas and the intensity of pressure and then the subject is taken up in detail covering dry rolling friction, static friction and lubrication and the effects of imperfect lubrication. In dealing with this and all the other subjects, the authors do not confine themselves to the set information of text books or to their own investigations, but quote freely from the work of other investigators, giving either summaries of what has been done or complete results, and in every case referring the reader to the sources of information where the subject can be studied more thoroughly if it is desired. For example, in this matter of lubrication, the text enters somewhat fully into the experiments that were made by Tower a number of years ago, giving his general results and then refers to the original publications in which his complete work can be found.

A similar treatment is afforded to springs, riveted fastenings, screws, cotters, tubes, shafting, belts, clutches, gearing, fly-wheels and frames. So that the volume is not only a convenient book of instruction but serves as a reference and index for work that lies beyond the limits that are available in it. It, therefore, becomes not only valuable to the student, but to the practicing engineer and designer as well.

Letters to the Editor.

"LIMITED SPEED OF PASSENGER LOCOMOTIVES."

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The editorial in your issue of December 24 on the "Limited Speed of Passenger Locomotives," will, I think, come as "a surprise and a disappointment" to your readers, for it seems to do less than justice to the steam locomotive. You say that the best efforts in locomotive building have not yet produced an engine which will haul five or six modern cars at much over 60 miles an hour. This seems to underestimate the speed capacity of the modern express locomotives by at least 25 per cent., for where the physical conditions of the road permit, and where the traffic makes it desirable, speeds of 75 miles an hour can be easily attained in regular service. I quote a few instances, which happen to lie before me. On July 1, 1898, a Vauclain compound Atlantic type locomotive ran the 55 miles from Camden to Atlantic City with five cars, at the average speed of 72.8 miles an hour from start to stop. On this trip 45 miles were done at the average speed of 81.8 miles, and 36 miles at the average of 82.8 miles an hour. During the following two months similar engines made the run daily with from five to seven cars, and at speeds averaging from 64.0 to 74.4 miles an hour, start to stop, the highest speed being made with six cars. On August 20 the train consisted of seven cars with 505 passengers, and the speed averaged 71.2 miles an hour from start to stop. Again, the three cylinder Atlantic type locomotive of the Philadelphia & Reading, to which you refer, has, I believe, recently shown its ability to haul five cars in regular service, seventeen miles over an undulating grade at the average speed of 79 miles per hour.

I think that many other portions of your article are highly debatable, as for example, the statement that with a balanced compound locomotive with only one valve for two cylinders, the steam distribution is less satisfactory than in the European type with a valve for each cylinder. O. Busse, Director of the Danish State Railways, after extensive experiments with an Atlantic type locomotive modeled after the Vauclain balanced compound, sums up the results of his experience as follows (Organ für die Fortschritte des Eisenbahnwesens, May 15, 1909): "For high speed service the four-cylinder locomotive is undoubtedly the locomotive of the future, and the Vauclain type, by using only one valve for two cylinders, avoids the disadvantage of complication. The indicator diagrams obtained at St. Louis in 1904 and in Denmark show that this arrangement gives quite as good a steam distribution as can be obtained with a valve for each cylinder."

LAWFORD H. FRY.

COAL CAR DISTRIBUTION.

New York, Jan. 21, 1910.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The decision of the Supreme Court enables me to substitute facts for some of the speculations in my article on coal car distribution which you printed on September 17, 1909.

In this article I called attention to the claim of the railways that the purchase of fuel from mines at points on their lines was not commerce, and consequently in supplying cars therefor they were not subject to the Interstate Act. The Supreme Court brushes this contention aside in the following words:

"It may not be doubted that the equipment of a railway company engaged in interstate commerce, included in which are its coal cars, are instruments of such commerce. From this it necessarily follows that such cars are embraced within the governmental power of regulations."

As a result of the Supreme Court's decision the order of the Interstate Commerce Commission stands. Under this order all cars are divided alike—with one exception, which authorizes a railway company to deliver to a particular mine all the foreign railway fuel cars, the private cars and the company fuel cars consigned to it, even though the number thereof might exceed its pro rata share. This exception is a recognition of the claim that only *undue* advantage is forbidden by the act, and that a certain advantage in car distribution is due to car owners. This advantage is a small one, but it is something.

The results of this decision may be considered under the five headings used in the article mentioned above.

First, in regard to railway fuel. There are a number of cases now where railways buy the total output of certain mines. It is likely that this practice will increase, as it would seem to be the only way in which railways can secure fuel at present prices. This will have a tendency toward concentrating the railway fuel orders in the hands of a limited number of shippers.

Certain railways have been trying to divide their fuel orders among their shippers in proportion to the commercial shipments made. It seems probable that this practice will be broken up. If this occurs, it is very possible that the shippers and the railways may unite in appealing to the commission to change its order as to fuel cars.

Second. Foreign fuel orders will also probably be concentrated in the same way, when the cars of the foreign railway are used.

Third. The operators whose mines are usually shut during periods of car surplus will probably receive a somewhat larger supply of cars in periods of car shortage, but not, by any means, so large an increase as they expect. The counting of the fuel and private cars in the total will of course make a larger supply for distribution *pro rata*, but the concentration of these cars at the fuel mines will have an opposite tendency, and that a very material one.

Fourth. The operators who ship all the year round will receive a slightly smaller car supply during car shortages.

Fifth. The owners of private cars will be deprived of all advantage from them except in those cases where they own enough cars to do all their business, when they can obtain the advantage described under the first heading. To get any advantage from their private cars they must, in practice, give up the use of railway cars altogether.

It seems certain that this advantage in distribution will not be sufficient to make it profitable to own private coal cars. If the owners of the cars succeed in selling them to the railways there will of course be an advantage to the shippers of coal who do not own cars; but if the private car owner goes ahead using his private cars until they are worn out and does not renew them, any present advantage to the non-car owner will gradually disappear.

As I said in my former article, "these private cars are of no advantage to the owners during periods of car surplus. The mileage paid by the railways is not enough to keep them in repair and pay for interest and depreciation. They are bought solely to supplement the regular supply in periods of car shortage," and are bought only by the coal operators who have an all-year-round business, who take contracts for a regular supply of coal and who feel bound by these contracts.

The Interstate Commerce Commission has, in practice, said that this private car method shall not be adopted by shippers of coal in order to make it possible for them to ship coal regularly. The Supreme Court has said the Interstate Commerce Commission has the right to make such a decision.

If the private car question were solely a question of coal cars another reference of the question to the Interstate Commerce Commission might be expected, but the commission has so plainly intimated that it does not favor any confusion between the relations of the car owner and shipper that no change in the order can be anticipated.

This leaves still unsolved the coal car question (raised only where there is insufficient storage) which may be put in this way: "How can consumers of coal be sure of getting a regu-

lar supply, and how can shippers of coal be sure of making regular shipments?"

The railways, of course, claim that coal should be stored like other commodities and held at points convenient for the consignee, so that the daily movement of coal from mine to industry need not be essential to the continuance of the industries of the country.

The shippers and consumers claim that the railways should always have such a supply of cars as to enable them to meet any demand. There are obvious objections to both of these courses, and some compromise will doubtless be worked out. Meanwhile, there has been no decision as yet in the cases which involved methods for rating mines, and possibly when the decision comes from the Supreme Court it may help along the situation. Here the essential question is: "Shall a mine be rated on the amount of coal which can be physically taken out of it in a day, or shall it be rated on its past shipments?" A decision that past shipments are a proper element in rating coal mines would help considerably the settlement of the coal car question. ARTHUR HALE.

LEGISLATION RELATING TO SAFETY APPLIANCES.

To the Editor of the Railway Age Gazette:

Referring to my communication entitled "Proposed Legislation Regarding Safety Appliances," printed in your issue of January 14, 1910, I beg to question somewhat a statement in your editorial comment printed on page 78 of that issue. It was not my purpose to denounce the proposed bill "on the sole basis of the success that has attended the work of the Master Car Builders' Association in the past." Furthermore, it is not the ostensible purpose of this bill to promote the universal adoption of the standards of that association, for, if it were, this and my preceding communication would be unnecessary. The Esch Bill H.R. 5702, Sec. 3, reads as follows:

"That within six months from the passage of this act the Interstate Commerce Commission, after hearing, shall designate the number, dimensions, location and manner of application of the appliance provided for by Sec. 2 of this Act and Sec. 4 of the Act of March 2, 1893, and shall give notice of such designation to all common carriers subject to the provisions of this Act by such means as the commission may deem proper, and thereafter said number, location, dimensions, and manner of application as designed by said commisison shall remain as the standards of equipment to be used on all cars subject to the provisions of this Act unless changed by an order of said Interstate Commerce Commission, to be made after full hearing and for good cause shown;" etc.

It is difficult for one having any knowledge of the manner of administration of the Safety Appliance acts to believe that the purpose of the proposed law is in any way to recognize the M. C. B. Association or its work, or, in fact, the present practices of the railways which are based on the M. C. B. standards.

The only quasi-legal standing that the M. C. B. Association standards have was their mention by name in an order of the President of the United States dated January 6, 1909, extending to the Canal Zone and railways in navy yards, docks and government property, and requiring that the various appliances for the protection of trainmen as designated in the existing standards of the Master Car Builders' Association, should be used on all freight cars in the above described territory. Up to that time link and pin couplers and any old arrangement of handholes, etc., had been deemed good enough for cars on government territory, while the railways of the country had under severe penalties been compelled to use specified appliances for ten years. It was worth waiting ten years, however, to have the M. C. B. standards recognized by name, although that is about as far as it got in some respects. A code of rules was drawn up by the commission for the Panama Railroad, and a comparison of these and the M. C. B. standards shows many radical differences and is a very significant indication of what the commission would do with M. C. B. standards if they were given the opportunity by law to designate "the number, dimensions, location and manner of application" of the devices. It would take too much time and space for a complete statement and analysis of the differences between M. C. B. practice, and that provided by the commission for the Panama Railroad, but a few examples may suffice for the present.

One is that four sill steps are required per car, while the M. C. B. practice requires two, located on opposite diagonal corners. A few years ago the legislature of Ohio passed a four-step law which was commented on by Secretary Moseley at the 1906 convention in the following language (see page 62 of the M. C. B. Proceedings, 1906):

"People do not realize that the national law is simply putting in force the rules and regulations which you, the Master Car Builders, have adopted as to many of them, thirty years, at least. Now the Master Car Builders' Association, in regard to the question of sill steps, require a sill step, as I understand it, and it is certain, where there is a ladder you need a sill step, or, if you have projecting sill you would need steps on both sides where the ladder is in the center of the car. To give a man a handhold and a sill step, and then for the man to get up there and find that he is there and cannot get down because of obstructions, perhaps, on the line of the road, and he cannot get up because there is no ladder, leaves him in a bad predicament. For that reason, unless you have a ladder he can reach, then you have hung him. It is for that reason, the desire of seeing no legislation which would conflict with the views of the Master Car Builders and their rules, that we take the position we do in regard to it. I would be glad to see any state pass a law that the rules and regulations of the Master Car Builders' Association should be law until such time as the Master Car Builders' Association in their wisdom see fit to change them."

As they do not require four ladders per car it is hard to justify four sill steps on house cars unless possibly constructed with projecting end, which, as the secretary says, might have ladders in the center, but the writer knows of no house cars so constructed.

Another point is the denial of the use of the uncoupling lever, the bracket of a brake step or the posts or railings of open platform cars as effective handholes when located within the proper zone and with proper clearances. It is difficult to understand what reasonable objection can be urged against the M. C. B. standard practice of allowing the use of substitute devices equally as effective, instead of requiring duplicate devices for the same purpose to bewilder and confuse when a quick choice must be made. It is possible that the commission's instructions on these points is based on some court decision, but, if so, the court certainly did not take into account the standing of the M. C. B. Association or look up the origin of the custom and practice of the roads in establishing these devices. If such is the case the legal departments of the railways are at fault in not making use of the value of the association, as the expert authoritative body that made up the original schedule of these devices and for years has maintained and built up regulations for their use, following the evolution in car building by adopting the principles originally framed for their use. The commission permits use of the bottom round of a ladder as an effective handhold, but why not other equally effective substitutes?

A number of other points might be cited but these suffice to show the mind of the commission as regards the details of the appliances as they would have them, regardless of the M. C. B. standards, railway companies' practice or precedent. The M. C. B. standards were all very good until 1908, but since then are very bad, although they are the same to all intents and purposes.

Were the secretary and the commission hoodwinked and deceived for all these years when there was such a profuse bouquet of compliments handed out each year by the genial secretary at the annual conventions of the association? The change has been since 1908, and why? Probably the honorable commission and its secretary would disclaim personal knowledge of these details, as they are not car builders, but get their information and advice from their corps of inspectors, for, as far as is known, they have no other mechanical advisors. These inspectors' views were probably incorporated in the commission's instructions to the Panama Railroad regarding safety appliances, and, if the proposed bill should become law and the commission be given the right to designate "the number, dimensions, location and manner of application"

of these devices, is there any doubt that the opinions of these inspectors would be enforced on the railways as the designation of the commission as to these appliances?

Now, a critic may say, why should not the opinion of an inspector who is among these things all the time be most valuable, especially as these inspectors were formerly trainmen, switchmen and the like, and have personal knowledge and understanding of the matter? The above contention should be granted on its own premises, but not in this case, and for the following reasons: The President of the United States issued an order extending the use of the M. C. B. appliances for the protection of trainmen to the Canal Zone. The commission, in preparing their instructions, ignored the President's instructions and the M. C. B. standards and put in their own ideas, and does any one doubt they came from the inspectors? Also, if these changes or departures from M. C. B. standards were few or minor in character less would be thought of it and an endeavor would be made to reconcile the conflicting views and opinions. When, however, the expression of their views on careful analysis shows a desire for changes in about three-quarters of the items under the M. C. B. standards for freight safety appliances it discloses a situation on which there can be no compromise except complete surrender, and that I believe the Master Car Builders' Association will never do. It is not possible, or reasonably consistent to state that the standards which were lauded year after year by Secretary Moseley and pronounced by him as "more complete than the law itself" are now three-quarters wrong and that almost every car in the country needs two additional sill steps, a number of additional handholds and the alteration of the position of some of the appliances now on the cars. All these things, and more, are required by the Panama Railroad rules and quite possibly would be under the provisions of the Esch bill.

While the writer cannot speak generally for the railways, so far as his information goes, it is believed that they would welcome the inclusion in the Safety Appliance acts of the Master Car Builders' standards with such provisions as to elasticity as to permit their ready adaptation to new types and developments of car construction and compel all railways to rigidly conform to these standards. They would then have the merit of being equally good or equally bad instead of being, as at present, of quite uncertain nature and merit, owing to the fact that one U. S. judge construes the law one way and another some other way, their interpretations being strictly technical and literal views of the language and the grammar of the Safety Appliance acts instead of being based on the customs, practices, origin and development of these devices. Custom and practice are said to make law; but they do not make Safety Appliance law.

X. Y. Z.

Contributed Papers.

CAR INTERCHANGE AT NIAGARA FRONTIER.*

In presenting a subject of such importance I want to compliment Mr. William Baird (C., B. & Q.) for the very determined stand that he made and the favorable impression made by him in his paper read at the October meeting of the Western Railway Club [*Railway Age Gazette*, January 21, page 139]. If his recommendations were carried out it would mean an enormous saving in time at transfer points. But it is necessary to go a great deal further than Mr. Baird's recommendations. The immense increase of freight passing through the country, the vast increase in the capacity of rolling stock and the service expected of it, bring us face to face with new conditions so rapidly that no country would have generals equal to the task of meeting them.

*From a paper by W. O. Thompson, Master Car Builder, N. Y. C. & H. R., read before the Central Railway Club at Buffalo, January 13.

The Niagara Frontier Car Inspection Association, which is in effect on the Niagara Frontier, from Buffalo to Suspension Bridge, and embraces all railroads interchanging, was put into effect some nine years ago. The foundation of this agreement is to expedite traffic and create honest methods. All cars are inspected and repaired by a force maintained by the receiving line. No cars make a backward movement, either for transfer or repairs, except for safety appliance defects, which are looked after and repaired before delivery. An Arbitrator is employed, who is under the direct supervision of an Executive Committee, and his services are paid pro rata by the roads in the agreement, and his duties are to look after the interests of the roads so far as carding and expense are concerned. Being connected with the Executive Committee, I have carefully noted the working of this arrangement for the past two years; and with an average interchange of 400,000 cars every 30 days, have found little or no cause for complaint from any point of view. Under ordinary conditions the inspection of the car is completed before the work of taking seals, destination, weight, etc., is covered by the Operating Department.

No greater force, for the welfare of the public and railways, has ever been produced than the Master Car Builders' Association, which with persistent energy and brain power has placed the rolling stock of this nation on the present high plane, and made possible the interchange of all cars with a small percentage of expense. This organization can be relied upon to meet future emergencies and the following suggestions must, sooner or later, be taken up and worked out:

The car owners shall be responsible for any and all necessary repairs required to keep their cars in service, either loaded or empty, no matter under what conditions the repairs become necessary.

Any road having in its possession a car, the property of another company, such car being in need of repairs, no matter whether the repairs needed to place the car in first-class serviceable condition be of light or medium nature, or whether the car is in need of general heavy repairs, the company having the car in its possession, to have the authority to make such repairs without consulting the owner and bill the owner for complete cost thereof, no matter whether the road making the repairs is located in California and the owner in Maine, or vice versa. The need is to have standard cars of each type in use throughout the country, in the construction of which standard types and uniform quality of materials be used, and with a universal pooling system in effect.

Maintain a committee something similar to Mr. Arthur Hale's Committee on Car Service to establish and maintain a ratio of equipment per mile of road.

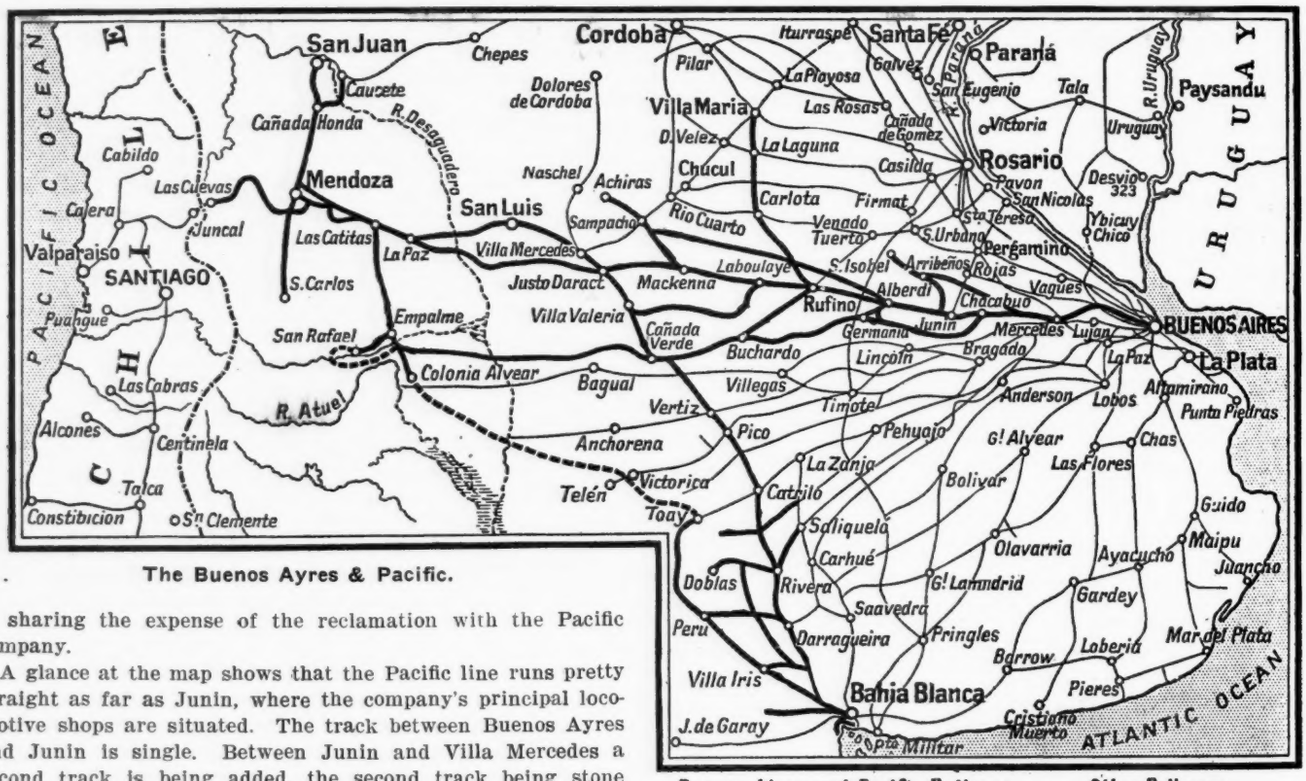
Maintain a Board of Arbitration, whose duties shall be to dispose of all charges covering repairs made, and to organize and direct a corps of traveling inspectors, the organization of which shall be similar to that of the Interstate Commerce Commission, and whose duties shall be to see that all roads maintain a common standard of materials and workmanship on all cars of all roads.

It is impossible, at this time, to even estimate the millions of dollars that can be saved, but enough saving is in sight from traffic, accounting and inspection standpoints alone to justify a careful consideration of the recommendations. With each car averaging 22.6 miles per day we have a total annual mileage per car of 8,249 miles. With the above suggestions in effect, the same car could reach 28 miles per day, making a total annual saving of 70 days per car.

BUENOS AYRES & PACIFIC.

The accompanying map shows the Buenos Ayres & Pacific lines, which, in connection with the Trans-Andian Railway, were described in the *Railway Age Gazette* of November 22, p. 919. The trip from Buenos Ayres to Mendosa, however,

deserves a description by itself. Leaving the Retiro station at Buenos Ayres the first part of the line runs between the ugly river on the right and the beautiful park on the left, and the viaduct which the railway company was obliged to build, so as not to spoil the view of the park, is a very fine, and, incidentally, an expensive one. The line passes through the most beautiful part of the city, Palermo and Belgrano containing some of the finest private houses. On the right of the line the company is carrying out great improvements and reclamation works which involve among other things the raising, by about 25 ft., of a square mile or so of country which is being reclaimed from the river; this forms part of the great scheme for the high-level entry of the Pacific company into the port of Buenos Ayres, for the construction of a terminus, quays, diversions of sewers and many other works which need a separate description. The raising of the level is being done by pumping mud on to the site and draining the water, the mud being obtained from dredgers engaged in the excavating of the channel; the Cordoba Central (B. A. P. extensions)



The Buenos Ayres & Pacific.

is sharing the expense of the reclamation with the Pacific company.

A glance at the map shows that the Pacific line runs pretty straight as far as Junin, where the company's principal locomotive shops are situated. The track between Buenos Ayres and Junin is single. Between Junin and Villa Mercedes a second track is being added, the second track being stone ballasted and laid with 100-lb. rails, now the standard practice on the Pacific company's main-line system. The stone ballast has to be carried great distances from the company's quarries at Sampacho, and the average total cost for ballasting is about $4.75 per yard; hence it can only be gradually introduced. On certain parts of the line a kind of soft rock or earth, of a pink color, is being tried in layers of 3 to 4 in. for the purpose of preventing dust.

Barbed wire fences are standard, often slung on posts of quite rough wood. Sufficient right of way is usually acquired between the fences for double the track.

From Junin the journey is continued along the famous 217-mile "tangent," often noted as being the longest and straightest piece of line in the world. The track is laid with 100-lb. rails and about 2,104 ties per mile.

From Justo Daract there is a double line as far as La Paz, the lower loop or "cut off" having been recently built with a maximum gradient of 0.5 per cent., the San Luis or northern branch (A.G.W.) having a maximum gradient of 1.25 per cent. The lower loop has only just been completed and the stations are not all named. Doubtless much of it would not have been built had the Argentine Great Western and Pacific companies agreed earlier.

Among the various problems which the Pacific company has to study, water and its lack provide some of the worst. Between Justo Daract and La Paz there is hardly any water for about 113 miles, and the district is at present almost uninhabited. Boring is taking place at a number of the wayside stations, but it is rash to predict what the future of such a district might become should water be found or irrigation introduced or a change of climate be brought about. At some places water was being piped 13 miles to the station, but by far the greater quantity is being carried in tanks, of which the company has over 30, the largest holding 8,448 gallons.

From La Paz the ground slopes gradually up to the Andes and the district is widely irrigated from the river Mendoza. Although the latter is small, and the methods adopted very wasteful, the gentle slope of the country and the impervious nature of the soil nevertheless enable an enormous area to be irrigated. This will probably be largely increased, for the railway company has an irrigation expert of its own, Mr. Kennedy, who has had experience in India. As it is, this part of the country is green and full of vineyards with poplars and willows in quantities, reminding one at times of northern Italy and at times of Belgium.

The light repairs to locomotives are done at Mendoza, the center of the western district, the heavy repairs being done at Junin. The eight-wheeled coupled engines are the standard freight engines on the Buenos Ayres & Pacific. The six-wheeled coupled is used as their standard passenger engine, they have also some new Kitson tank engines.

In the winter there is comparatively little traffic, but in the busy season there are quite a number of trains a day. The development of the district on each side of the line is helped in every way by the company. The limit of distance which it pays to bring wheat to the railway by cart probably does not average more than 10 miles, owing to the roughness of the roads.

No wood fuel is used in this part of the country, wood being too scarce, although coal costs over $12 per ton.

THE TRACTIVE POWER OF SIMPLE AND COMPOUND LOCOMOTIVES.

BY SIDNEY C. CARPENTER.

The accompanying diagrams, Figs. 1 to 4, enable the tractive power of simple locomotives to be very closely approximated without calculation and also enable any factor in the formula to be found when the others are known.

The tractive power for simple locomotives is obtained from the formula $\frac{D^2 L .85 p}{d}$, where D = cylinder diam. in inches, L = stroke in inches, p = boiler pressure and d = diam. of drivers in inches. Diagram Fig. 1 gives the value of $\frac{L}{d}$, Fig. 2 gives the value of $\frac{D^2 L}{d}$, and this value is multiplied by 85 per cent. of the boiler pressure, in Fig. 3, to obtain the tractive power. Diagram Fig. 3 carries this value up to 350 and the tractive power up to 75,000 lbs.

A number of examples are given below to show the use of the diagrams.

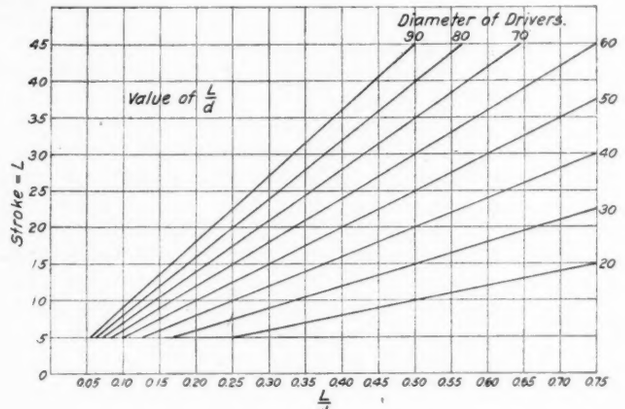


Fig. 1.

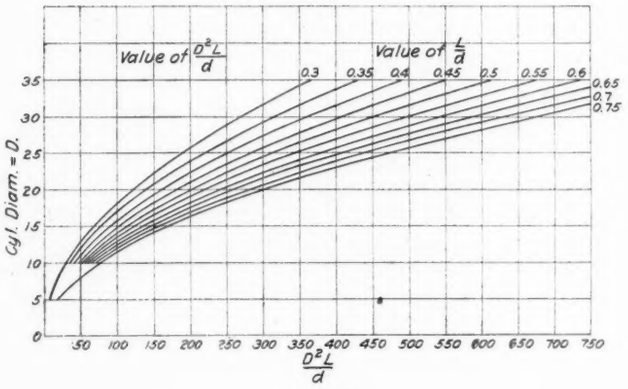


Fig. 2.

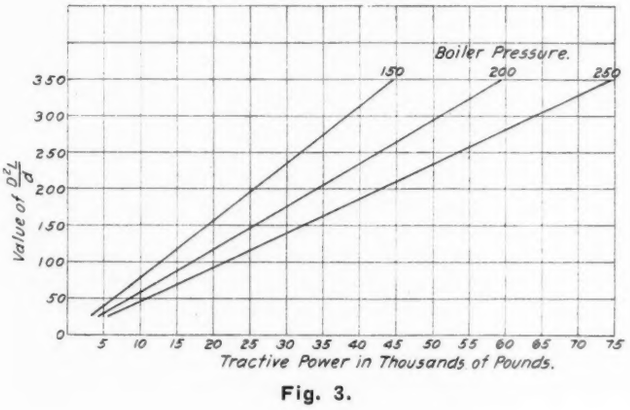


Fig. 3.

Find the tractive power for an engine with the following dimensions:

Cylinders, 20 in. x 28 in.

Drivers, 80 in.

Boiler pressure 200 lbs.

In diagram Fig. 1 find the 28-in. stroke at the left, following horizontally to the diagonal for 80-in. drivers and down to the value of $\frac{L}{d}$ which equals approximately 0.35. In diagram Fig. 2 find the cylinder diameter, 20 in., at the left, follow horizontally to the diagonal 0.35 and read at the bottom the value of $D^2 \frac{L}{d}$ which equals 140. In Fig. 3 find 140 at the left, run over to the 200-lb. diagonal and down to the

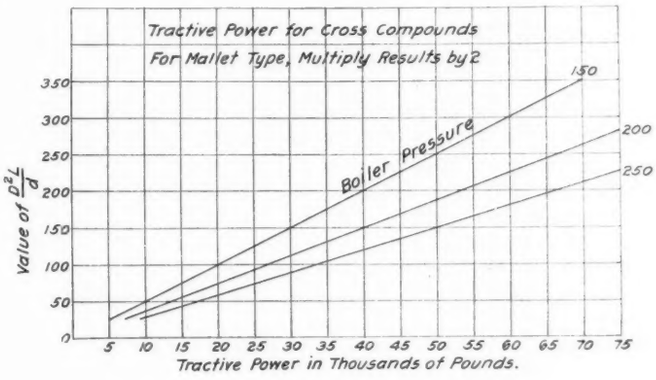


Fig. 4.

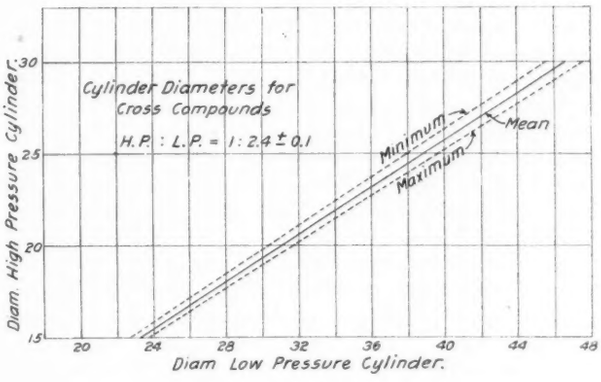


Fig. 5.

tractive power, which is 24 or 24,000 lbs. Calculation gives about 23,800 lbs.

An engine is required to develop 19,000 lbs. tractive power. The boiler pressure is 200 lbs. and the drivers are 50 in. diameter. What should be the diameter of the cylinder if the stroke is 22 in.?

Referring to the diagram, Fig. 1, we find the value of $\frac{L}{d}$ to be about 0.44. Referring to Fig. 3 we find the value of $\frac{D^2 L}{d}$ to be about 110. Now referring to Fig. 2 we find from 110 at the bottom and the diagonal 0.44 that the cylinder diameter is about 15½ in. or 16 in.

An engine has cylinders 19 in. x 24 in. and a boiler pressure of 180 lbs. What must be the diameter of drivers to give a tractive power of 19,500 lbs.?

From diagram Fig. 3 run vertically from 19,500 lbs. to a point a little less than half way between 150 and 200 lbs. and find the value 125 at the left. On Fig. 2, from 125 at the bottom and 19 in. at the left find 0.35 as the value of $\frac{L}{d}$. On diagram Fig. 1, from 0.35 at the bottom and the 24-in. stroke the diameter of drivers is found to be about 68 or 69 in.

The boiler pressure and stroke can be found in the same way.

Diagram Fig. 4 is similar to diagram Fig. 3, but applies to cross compound locomotives. In the calculation of this diagram the Baldwin Locomotive Works formula is used. This is $\frac{D^2 L 4/3 p}{d}$ where the letters have the same meaning as in the first formula. To apply this diagram to Mallet compounds, multiply the final result by 2.

Diagram Fig. 5 gives the proper relation between the high and low pressure cylinders. According to the Baldwin Locomotive Works the ratio of the high and low pressure piston areas should be 1 to 2.4 with an allowable variation of .1 either way. The diagram gives the maximum, mean and minimum diameters as figured on this basis.

LOCOMOTIVE BOILER PRACTICE IN FOREIGN COUNTRIES.

The report on "Improvements in Locomotive Boilers," presented at the eighth session of the International Railway Congress, was written by B. H. Fowler, locomotive works manager, and L. Archbutt, chemist, Midland Railway, England. The report covers 100 pages of the proceedings pamphlet, and includes descriptions and illustrations of locomotive practice on the principal railways of Great Britain, India and South Africa. The following are the principal conclusions drawn from the replies to the committee's questions and the discussion at the Congress:

Probably the greatest change in boiler construction which has taken place in recent years on the lines reported upon is in the largely increased use of Belpaire fireboxes, the majority of newly designed engines having this type. One great advantage derived from this change is that the disuse of roof-bars leaves the space over the top of the firebox clearer and more easily washed out, and some of the lines which have not adopted the Belpaire box have in their later boilers fitted radial stays with the same object in view. There seems to be less trouble with a copper tube-plate when fitted in a Belpaire than in a round-topped box, but this point is perhaps open to question.

A few of the lines employ wide, comparatively short, fire-boxes which are placed over the frames, and the Great Northern Railway of England is getting particularly good results with this type. It readily allows a large grate area and facilitates the renewal of any defective stays, but with passenger engines at all events, entails a small uncoupled trailing wheel.

The weight of the engine, as a whole, has an important bearing upon the design of the boiler, for in order to keep the load per wheel down it has frequently been found necessary to slope the door-plate forward, so as to prevent the load per unit of area on the trailing journals becoming too great, and this in spite of the fact that these bearings are sometimes as much as 10 in. in length and 8¾ in. in diameter.

In spite of its high and at times excessive price, copper is still very generally used for fire-boxes on the railways reported upon, and no consistently good results seem to have been obtained with any other material, although one or two lines use steel for goods or secondary engines which are not heavily worked. It is interesting to note that although two lines have tried cylindrical steel fire-boxes, they have not extended their use. This seems largely due to the difficulty of raising steam in them, owing to the poor circulation due to a considerable body of the water in the boiler being below the source of heat and, therefore, not affected by the convention currents set up.

One of the reasons for the abandonment of steel fire-boxes has been the trouble from corrosion, and to endeavor to meet this, nickel steel has been experimented with, but up to the present has not been found satisfactory.

The advantages of employing high pressure steam are becoming more and more realized, and a number of lines use 200 lbs. per sq. in., whilst with two it rises to 220 and 225 lbs. In one of the latter, they employ it in compound engines, whilst the other, on which the engines are simple expansion, use the highest pressure met with, viz., 225 lbs. These higher pressures, as might be anticiptated, tend to accentuate boiler troubles, and render more imperative the employment of good water and the selection of tubes and longitudinal stays which will not cause excessive distortion of the tube-plate Some lines have found that the troubles associated with higher pressures have not been compensated by the advantages gained, and have returned to a lower maximum.

The question of weldless barrel-plates is of considerable importance, and a large firm of steel makers in Sheffield have put down extensive plant for the manufacture of these plates, which are being tried by one line, at least in England.

On the whole, it may be said that the proportion of steel and iron tubes to copper and brass is growing, and several of the British lines have wholly dispensed with the latter expensive metals. In India it may be noted that brass is very extensively used, and pitting just inside the ferrule, due to mechanical action from the coal, does not seem to give the trouble it does on some lines. As might be expected, steel and iron are much more liable to corrosion than the other metals, especially near the fire-box, and nearly all who use these materials arrange for the renewal of this end of the tube when the corrosion has rendered it unfit for further use. Copper ends and sleeves are occasionally employed to prevent this defect.

Considerable attention is now paid to the expansion of the tube into the tube-plate, this being generally carried out by mechanical means. Attention has also been given to the order of expanding, various procedures being adopted to prevent, as far as possible, the distortion of the tube-plate caused by the work put on it during expansion.

Opinions are still divided as to the relative merits of the arrangement of tubes in vertical or horizontal rows, but the former seems to be gaining ground, as it keeps the boiler cleaner, allows steam to rise more readily when working, and scale to fall more freely during washing-out.

Attention is being given in many quarters to the better regulation of the admission of air to the fire, and this should lead to improvement in the maintenance of the firebox tube-plates; no full particulars are, however, yet available. The question of a forced draught on the "plenum" principle is also being considered, but nothing practical has yet been evolved, and although such a system would effect a great improvement, the quantity of air to be admitted with an express engine is very great, rising in some cases to at least 8,000 cubic feet per minute.

The increase of pressure and harder work to which modern boilers are subjected, has led to more attention being paid to the arrangement and spacing of tubes and stays, especially with a view of giving greater flexibility at the corners where cracking usually takes place.

Although "extended" smoke-boxes are only used by a few of the lines, yet there is an increasing tendency to enlarge these boxes with a view to equalizing the "draw" through the tubes and preventing to a certain extent the ejection of sparks. Little has been done with regard to water-tube boilers, and the use of water-tubes in the fire-box of the Drummond type has not met with general favor; but, in addition to the cases mentioned in the report, the Japanese State Railways are adopting these water-tubes to a certain extent.

At the time of writing this report, there are only two lines in the countries reported on which are using superheaters to any large extent. There are, however, a number of others who are experimenting with this type of engine, and it is probable that their use in the countries dealt with will shortly be considerably extended. The replies received show that the

practice of the different lines in regard to water-softening varies greatly, some having adopted it extensively and others practically neglecting it. The softeners in use include the following: Archbutt-Deeley, Desrumaux, Kennicott, Pulsometer, Reisert, Porter-Clark and Wollaston. In one case, Mirrlees-Watson Yaryan Distillers are used. The chemicals used in softening are invariably lime and soda.

When the proportion of soluble salts in the concentrated boiler-water reaches 150 to 350 grains per gallon the amount varying with the type of boiler, rate of steaming, and nature of the salts, foaming of the water is sufficient to cause serious priming, and for this reason it is found necessary to limit the amount of soda used in softening. To overcome this difficulty, some railways have tried barium compounds in place of soda or soda-ash in softening, but the cost has always been found to be prohibitive; in fact, with some waters it may be as cheap or cheaper to distil the water and thereby remove all impurities as to soften with barium salts.

The experience of those railways which have adopted water-softening shows that great saving is effected thereby in the cost of re-tubing boilers, replacing broken stays, and removing scale, while leakage is practically stopped. Two lines record a large saving by being able to soften and use water which can be obtained cheaply, instead of purchasing expensive water of better quality.

Since the date of the last report (1900), the use of water-softening plants has considerably extended among the railways reported on, and we do not doubt that it will continue to extend as the saving which is capable of being thus effected becomes better realized. One reason why progress in the past has been slow, is the fact that water-softeners were regarded as machines which required no scientific control and could be efficiently run by the laborer in charge. Most railways now employ chemists, and it is realized that the water-softeners should be placed under the supervision of the chemical as well as of the engineering staff. Those railways which have been working on these lines, find that the results obtained well repay the cost entailed by water-softening.

To obtain the best results, water-softening should be used in conjunction with a system of changing the water in the boilers before it has become too concentrated in regard to sodium salts, or saturated as regards that part of the calcium sulphate which cannot be economically removed without unduly charging the water with sodium salts. To enable the water to be changed with the necessary frequency, and without engines spending too much time in the shed, the boilers must be filled up with hot water. When the amount of sodium salts or calcium sulphate in the original water is excessive, undue concentration can only be prevented by the use of blow-off or scum-cocks, of some description. The practice adopted must be based upon and controlled by a systematic chemical analysis of the principal waters used by the locomotives in each district.

Disincrustants are used in the boilers by a few railways, those most commonly employed being preparations containing tannin or soda alone, or a mixture of the two. The experience of some lines has been unfavorable, others have given up the use of disincrustants in favor of water-softening.

For the prevention of corrosion, some railways obtain good results by coating the boiler plates with Portland cement; but in one case it was found that in the boilers in which this was used it washed off and was a failure. A coating of graphite and boiler linseed oil has been tried, but was found to percolate through the seams and joints and cause leakage. On one line the boilers are painted inside with tar and graphite. Zinc plates and plugs have been tried by several railways, with unsatisfactory results. Some lines have found the addition of a definite excess of slaked lime to the water distinctly advantageous in preventing corrosion, especially in the case of natural soft waters.

The majority of the railways still use cold water for washing-out boilers, but the use of hot water is extending.

On many lines the use of blow-off cocks or scum-cocks to prevent priming is necessitated by the bad quality of the water which has to be used.

There seem to be no special features in the replies to questions on cracks, pitting, grooving and general surface corrosion, as all the lines suffer more or less from these defects in much the same manner and in the same position in the boilers Although various steps have been taken to prevent these troubles, none seem to be universally satisfactory. Efforts are being made to increase the water-spaces around the sides of the fire-box to prevent breakage of stays and corrosion of fire-box plates; to give larger radii at corners and prevent the tubes from coming into close proximity to the edge of the tube-plate to lessen the chance of cracking, etc., and these doubtless help to minimize the troubles; while water-softening and mechanical cleaners also help in this direction.

Practically two, and only two, types of material are employed for boiler stays, viz., copper, and a bronze (Stone's), containing copper with nickel, manganese and iron. (For analysis see table 6, reply from Midland Railway.) The latter material is stronger at boiler temperatures than copper, but the head of the bronze stay tends to burn off more readily than copper, and some lines state that the heads are liable to break off in the fire-box plate.

There does not seem to be a great deal of trouble with stays fracturing, except at the top front corner of the fire-box, and even here the trouble is not marked enough to cause the special flexible stays, as used in America, to be adopted.

DISCUSSION OF THE HINE SYSTEM OF ORGANIZATION.

Major Charles Hine's paper on "The Unit System of Organization," which was published in the *Railway Age Gazette* of January 21, called forth an interesting discussion when it was read by the author at the meeting of the Western Railway Club on January 18. As is known to most readers of this paper, Major Hine worked out this system as it is being applied by Mr. Kruttschnitt on the Harriman lines.

Prof. Wallace, of Purdue University, sent a letter commending the Hine system as designed to secure much needed co-ordination between the different branches of the operating department. He said in part: "I have closely watched the development of the unit system of organization and I have been impressed with its importance. Its advantages are despatch, flexibility, fairness, broadening effect upon the individual and upon the organization as a whole, and, lastly, a chance to show one's individuality. The mere fact that all correspondence is to be signed by the individual and not by some other person is itself a very strong point. If the employee is assured that all communications are signed in person I feel confident that better results will be obtained. I recall that when I was in railway service I would often wonder whether a particular communication was really signed by the supposed writer or by some stenographer or clerk. I feel that with the principle enforced that the signature attached must be bona fide much injustice will be eliminated. One of the strongest features of the system, as I see it, is the broadening effect it must have upon the individuals who make up the division unit. The very princple is one of education and improvement. The assistant superintendent representing the mechanical department will be a much stronger and broader man from coming in contact with the problems of the engineer, the despatcher and the division superintendent. It is a foregone conclusion that anything that tends to make the individuals of an organization more proficient also makes the organization as a whole more proficient. I therefore conclude that the unit system will ultimately produce an intelligent and efficient organization. There can hardly be a question about this system being more flexible in many respects than was the old way of doing things. As pointed out by the

speaker, the saving in correspondence and the clothing with authority of the man on the ground, whoever he may be, must expedite and curtail the expense of the company's business.

M. K. Barnum, general inspector of machinery and equipment of the Burlington, raised the question how, when there are several assistant superintendents on a division, each having general jurisdiction over all branches of the service, the giving of conflicting instructions is to be avoided. For example, might not the assistant superintendent, who formerly was chief engineer, give instructions regarding mechanical matters which were not in accord with the best mechanical practice? Major Hine replied that this question suggested the weakest point in the unit system. He believed, however, that the superintendent would be able to maintain the proper balance between his subordinates. It had been found on the Harriman lines that there was more trouble in getting officers to interest themselves in branches of the service besides their own special one that in keeping them from so encroaching on each other's specialties as to make trouble. The advantage of the system, he said, is that while it lets each man continue to give most of his attention to the branch of the service in which he is an expert, it also enables each to exercise more or less supervision over other branches. For example, under the old system, if the division engineer was riding on the rear of a train and criticized the flagman for not having gone back far enough when the train stopped, the flagman probably would tell him to "go to thunder." If, then, the division engineer made a complaint against the flagman the trainmaster was apt to constitute himself counsel for the defendant flagman because the flagman was "his man." The unit system prevented this sort of thing by making all the various assistant superintendents the superior officers of the flagman and enabled them to administer a sort of summary police court justice. The extent to which the different officers were disposed to assert their new authority under the unit system differed with individuals. For example, the engineer of one division who was rather conservative, had remarked that about the only result of its establishment affecting himself that he had observed was that the train crews no longer smoked cigarettes in his presence.

W. L. Park, general superintendent of the Union Pacific, spoke briefly regarding the working of the new organization on his road, where it was first tried. As illustrating how it has worked he said that after it was adopted on one division the general roadmaster walked over to the office of the chief train despatcher and jokingly said to him: "Now, Mr. McGinnis, I am an assistant superintendent, and don't you ever dare to say another word back to me." He believed that the various assistant superintendents under the new organization were using their increased authority for the good of the entire service.

C. A. Seley, mechanical engineer of the Rock Island, said that he could see where better co-ordination of the different branches of the operating department is desirable and necessary. The writing of letters to the fellow across the hall has been carried to an extreme in all departments. He raised the question as to where one occupying an office such as his would find himself if the new method of organization were extended logically over the entire railway system. Major Hine, in reply, drew a distinction between staff officers and line officers in the railway service. The line officer handles men. The staff officer deals with things. In the mechanical department the superintendent of motive power is the line officer, and the mechanical engineer is his expert adviser, and, therefore, a staff officer. Under the unit system, his work, and probably his title, would remain substantially unchanged. Under the old system on the Harriman lines the rules said that the master mechanic would report to the superintendent of motive power on purely technical matters, and to the superintendent on other matters. Unfortunately, differences of opinion arose as to what were purely technical matters. Under the present system the master mechanic reports to the superintendent on all matters, and the superintendent reports to the superintendent of motive power on technical matters, or, in other words, the master mechanic reports *through* the superintendent to the superintendent of motive power on technical matters. The question was raised as to whether the change in title of mechanical and engineering officers would not militate against their receiving offers of promotions from other railways. Major Hine, in reply, called attention to the fact that Mr. Kruttschnitt is the only man who bears the title of director of maintenance and operation, and yet this has not prevented anyone from understanding exactly what work he does.

W. E. Symons expressed the view that the unit system of organization makes practicable a broad gage, common-sense use of all the operating forces of a railway. Much time, he said, is lost to the railways because officers run over the road without full tonnage. A master mechanic, for example, may have to go from one end of a division to another to attend to some matter which had just as well be attended to by some officer of corresponding rank who is already there. The unit system of organization making assistant superintendents of all division officers of similar rank with authority over all branches, makes it possible to take up this lost motion. The highest educated man is the most useful man. Therefore, the man on the railway who can perform only one duty is not as useful as he would be if the scope of his work were broadened. Mr. Symons did not think that men who are trained under the unit system of organization would have less difficulty in getting promotions to other roads, for he believed that any road would rather have a master mechanic or division engineer who had had transportation experience than one who had not.

Replying to various questions, Major Hine said that in applying the unit system of organization on the Harriman lines there had been no changes in salaries; nor had any man lost his position on account of the change. The plan is being considered of providing for progressive increases in salaries, based on length of service. In the past railway salaries have depended too much on how many friends a man might have on other roads who would offer him positions. It was originally thought that under the unit system of organization the chief clerk could be dispensed with, but it had generally been found more expedient to bring the various clerks of division general officers together at the general office, where are also concentrated the offices of the assistant superintendents, and to place them in charge of one man who usually bears the title of chief clerk. In one case the chief clerk has been given the title of "senior clerk."

ECONOMICAL WOOD PRESERVATION.

BY ROBERT HAYS.
San Diego Southern Railway.

Despite the numerous methods introduced within the past few years for materially reducing the cost of timber preservation, there are still many railway, telephone, mining and industrial companies, and a multitude of individuals, who regard the cost of such preservative treatment as prohibitive, even though they may admit its desirability and appreciate its economy in the resulting decreased annual charge during a cycle consisting of a number of years.

The use of crude oil or petroleum for the hot or preliminary bath in the open tank or absorption process will very considerably lessen the cost of such treatment in the regions where crude oil is low in price. This especially refers to the western and southwestern states, which annually produce many millions of barrels of crude petroleum, and in which states, by reason of their distance from the principal centers of American and European creosote production, creosote com-

mands a comparatively high price. In these sections crude petroleum may be bought for as low as 60 cents per barrel. Ninety cents per barrel, equivalent to $.0028 per pound, is perhaps an average price, while crude or commercial creosote, even in moderately large quantities, costs something like 20 cents per gallon or $.023 per pound.

Except in occasional instances, tests and experiments innumerable have demonstrated that crude petroleum possesses very little value as a preservative against the attacks of wood destroying fungi, yet for the first, the hot or preliminary bath in the open tank method of timber protection, whose function is merely to evaporate the moisture in the wood cells and expand the air in the cells and intercellular spaces, the writer has found that petroleum serves almost equally as

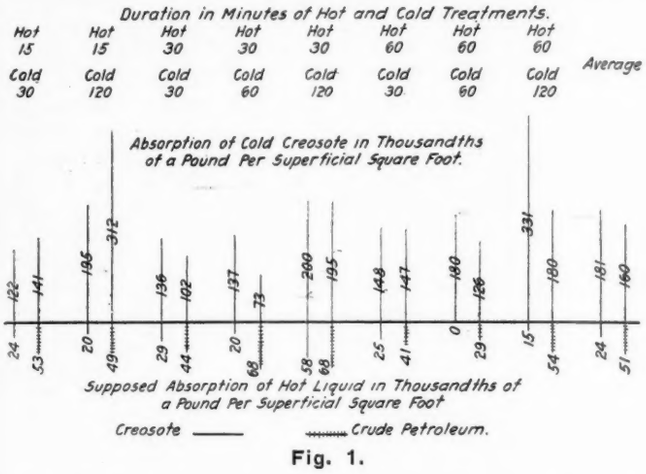
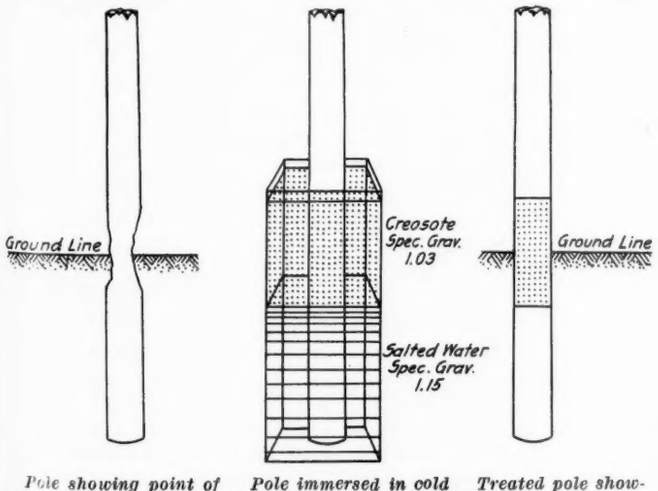

Duration in Minutes of Hot and Cold Treatments.
Hot 15 Cold 30
Hot 15 Cold 120
Hot 30 Cold 30
Hot 30 Cold 60
Hot 30 Cold 120
Hot 60 Cold 30
Hot 60 Cold 60
Hot 60 Cold 120
Average
Absorption of Cold Creosote in Thousandths of a Pound Per Superficial Square Foot.
122 141 195 312 136 102 137 73 260 195 148 147 180 126 331 180 181 160
24 53 20 49 29 44 20 68 58 68 25 41 0 29 15 54 24 51
Supposed Absorption of Hot Liquid in Thousandths of a Pound Per Superficial Square Foot
Creosote
Crude Petroleum.

Fig. 1.

well as the more expensive creosote in so far as preparing the timber for successive immersion in cold preservative. The schedule here shown indicates that the absorption of creosote during the subsequent cold bath given the timber varies inconsiderably when either crude petroleum or creosote are used for the preliminary treatment. By weight, however, more crude oil is absorbed during the preliminary bath than creosote, conditions and duration of application being the same, but it should be remembered that, according to the figures presented earlier in this article, crude petroleum costs but one-eighth as much. The slightly greater absorption of cold liquid apparent in some of the tests in which creosote was exclusively used, and in the average of all tests, is probably due to variations in the structure and closeness of the wood.

The writer's tests were made on Douglas fir or Oregon



Pole showing point of attack by wood-destroying fungi, at or near ground line.

Pole immersed in cold bath of salted water and creosote, showing segregation of liquids.

Treated pole showing creosoted portion above and below the ground line.

Fig. 2.

pine. This wood does not lend itself readily to the open tank method of treatment, and it was desired to make the experiments under the most unfavorable conditions likely to be encountered in actual practice. Unfortunately, no really proper tanks or other appliances for treating timber of any considerable size were available, so small sawn blocks were used. The liquids were heated by electricity, as the low flash point of the petroleum employed (about 60 deg. F.) prevented the use of any flaming heat. The temperature of the hot solutions was maintained between 212 deg. and 225 deg. F. As the test specimens were small, and the periods of immersion short, resulting in the absorption of a relatively small amount of liquid, Troy weights (7,000 grains per avoirdupois pound) were used to insure greater accuracy. It was deemed unnecessary to lengthen the treatment into a number of hours, such as would be accorded timber in actual practice, as the absorption and penetration of different woods, in many different stages of seasoning, and under a multitude of different conditions, have been amply demonstrated by exhaustive experiments, and the object of this particular test was solely to obtain figures relative to the comparative absorption of creosote when the treatments were commenced with hot baths of petroleum and creosote.

The resulting absorption is expressed in pounds per superficial square foot. The superficial square feet of a piece of timber are the total area in square feet of its several surfaces. It has long been deplored that the cubic foot should have entered into calculations involving the surface or superficial application of a preservative to lumber, in which the cubical contents of the timber are not a factor. Unless the

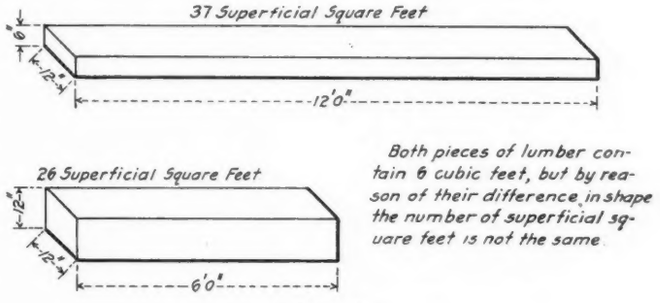

37 Superficial Square Feet
6"
12"
12'0"
26 Superficial Square Feet
12"
12"
6'0"
Both pieces of lumber contain 6 cubic feet, but by reason of their difference in shape the number of superficial square feet is not the same

Fig. 3.

sizes of timber are given, one gets no idea of the amount of preservative actually absorbed when figures are presented like "ten pounds per cubic foot." No person would undertake to determine the cost of sweeping the streets of a city, or contract to paint a house, on a cubic foot basis; such a unit is foreign to calculations of this character, and equally foreign to calculations of the absorption of creosote by timber, when such creosote penetrates but a relatively short distance into the wood. The only exceptions might be in the case of small cross arms of soft wood, and paving blocks, in treatment of which the preservative fluid would probably be expected to completely impregnate the timber. Of course, in the case of railway ties, poles and piling, the discrepancies are less apparent, on account of a lesser variation in the sizes of these commodities, but with bridge, trestle or mining timbers the differences are great. Each piece of lumber in the illustration contains exactly 6 cu. ft., yet the 12-in. x 12-in. x 61 ft. block measures 26 superficial sq. ft., while the 6-in. x 12-in. x 12 ft. board exposes 37 superficial sq. ft., a difference of 11 superficial sq. ft. Were these two pieces of lumber of the same species, having the same attributes in the way of hardness, closeness and moisture content, and should they be treated together in the same vat or vats, and for a similar period, the board 12 ft. long would undoubtedly absorb 42 per cent. more preservative than the 6-ft. piece, despite the fact that their cubical contents are precisely the same. It is to be hoped and urged that those interested in the preserva-

tion of timber will adopt a unit of measurement more expressive and explicit under the circumstances than the customary but grossly sufficient term of cubic foot.

In the treatment of poles, fence posts and similar lumber products, a considerable saving may be effected by the use of salt (sea) or salted water in conjunction with creosote and crude petroleum. The fact that the wood-destroying fungi which we must combat demand four requisites for their existence has been repeatedly proven. These necessaries are food, air, moisture and heat. Deprived of any one of them, life is impossible.

Except in very moist climates, the upper portion of a pole—that section extending from a point 18 ins. or 2 ft. above the ground line to the top—rarely decays unless attacked by dry rot, on account of the lack of moisture. The tip itself, otherwise very vulnerable because of the exposed grain, is usually either beveled or pointed, and often painted, so that moisture has almost no chance to collect or penetrate here. That portion of a pole or post which is 2 or more ft. below the surface of the ground is seldom surrounded by sufficient air to permit of the existence of wood-destroying fungi. There remains but one region, therefore, subject in most cases to attack: That section extending from approximately 2 ft. below the ground line to a point about 2 ft. above the surface, and this portion usually has in close proximity all the necessary elements for the life and the nefarious work of wood-destroying parasites. It may be conceded then that any preservative fluid introduced at other points of the pole or post are, if not unnecessary, at least of much less value than the solution injected at the vulnerable point at or near the ground line. The open tank process, which, if desired, treats only the butts, instead of the entire pole as in the pressure or closed retort process, was the great beginning of a cheaper form of effective preservation. The process here outlined, and illustrated in the accompanying drawing (No. 2) should, if adopted, reduce the cost of pole and post treatment to such an extent as to place it within the reach of many corporations and individuals who now refrain from adopting protective measures.

The hot or preliminary treatment given the test specimens in the experiments conducted by the writer consisted of a bath in hot crude petroleum, as outlined above. The cold bath was as follows: Taking into consideration the displacement of the timber, a receptacle was partially filled, to a certain height, with water in which sufficient salt had been dissolved to raise the specific gravity of the solution to 1.15. This sufficed to sustain easily the creosote, which was then added and whose specific gravity was 1.03, and the timber was then placed in the receptacle and allowed to remain for the required period of time. The result was a stick with a belt or girdle of creosoted cells at a point which on a pole would correspond with the region about the ground line.

As it is well known that most of the preservative in the open tank process is absorbed during the second or cold immersion, it will be readily seen that the substitution of salted water, the cost of which is infinitesimal when compared with that of dead oil of coal tar or creosote, for the extreme lower portion of a pole or post will very materially tend to still further decrease the cost of treatment—may even reduce it 40 or 50 per cent. below the present relatively low cost already attained through the employment of the open tank or non-pressure process. It mignt be explained that the use of salted water, when seawater was obtainable, was on account of the more apparent readiness with which fresh water absorbed salt and attained the required specific gravity. Undoubtedly seawater will prove more practicable in regions where it may be obtained, and where sufficient time is allowed for it to absorb the required amount of surplus salt to increase the specific gravity to the requisite point.

It may be contended that the impregnation of the butt of a pole or post with water is undesirable, when all recognized authorities are insistent that timber be as dry as possible before treatment and preceding its use. But it should be remembered that in the open tank method capillary action and the partial vacuum created by the expansion and contraction of air in the wood cells are the agencies by which the solution is drawn into the wood, and the penetration, even under most favorable conditions, does not usually exceed 1 in. This water must not be compared with sap, which is much thicker and heavier, more tenacious and much less readily evaporated, for it will quickly pass off during a brief period of subsequent seasoning. Even were it to remain in the timber, it is questionable if, on account of its situation in the butt, buried in the earth, its presence would prove harmful. If the ground in which the pole or post is set is moist, it would partake of some of the moisture in any event, and if the surrounding earth be dry, the soil will absorb a portion at least of the moisture content of the timber.

THE DEVELOPMENT OF CANADA.

C. W. Peterson, general manager of the Canadian Pacific Navigation & Colonization Co., in describing, at the Royal Colonial Institute, the plans of C. P. R. for colonization, said in part:

"Having in view the possibilities of the small farm under irrigation, and realizing the expediency of a much stronger effort towards directing British immigration to Canada than that put forth in connection with the movement of people from other countries, Sir Thomas Shaughnessy formulated the broad lines of an agricultural holdings plan which, it is expected, will have precisely that effect, and whereby 'ready-made farms' will be provided for British colonists under the most favorable conditions consistent with good business administration.

"In submitting the main features of this project, it might be well to point out that while, to a certain degree, imperialistic as well as philanthropic considerations enter into Sir Thomas' project, it rests on a distinctly business foundation. It would not be successful under any other conditions. It may, therefore, be taken for granted that the class of colonists the railway company will endeavor to interest in its project is one that gives reasonable promise of being successful and independent. The conditions and restrictions surrounding the scheme will be designed with that end in view. The company believes in the small farm. For that reason the holdings will be limited to from 80 to 100 acres of irrigable land, or 160 acres of non-irrigated lands situated in the more humid belt of the West.

"It is the intention of the company to erect all absolutely necessary buildings in advance of the arrival of the colonist. These buildings will be designed to house the settler and his live stock for the first few years, and until such time as he is able to provide more commodious structures himself, when the original buildings may be utilized by him for other necessary purposes. These structures will be of the class generally erected by the newcomer. Placing contracts for these buildings in a wholesale way will, it is reasonable to suppose, enable the company to obtain the closest possible prices for work and material, of which, of course, the individual colonist reaps the benefit.

"The initial period is generally the critical one. Colonists often become discouraged, after settling on the virgin prairie, during the time which elapses before a cash revenue begins to come in. Through inexperience many settlers overestimate the effectiveness of their capital, and a promising career is at times brought to a sudden termination owing to such miscalculation. To make the colonist almost immediately revenue-reproducing, it will be the aim of the company to break up a portion of each holding, probably from 40 to 60 acres, the year prior to his going into occupation, so that there may be a crop available in a few months after he has taken possession. This crop ought to provide a cash income

during the first season, varying from £100 ($500) to £250 ($1,250), according to the season and the state of the grain market.

"The total cost of putting up the necessary buildings, preparing the crop, providing domestic water supply, and enclosing the holding with a suitable fence, will be added to the regular price list of the land, and the settler will be given the opportunity of repaying the amount in ten equal, annual instalments, with the usual rate of interest on the unpaid balance.

"It would be the company's intention to settle the colonists in units up to sixteen families. This would give a sufficient population to have school facilities provided at once in each settlement. A main road would be graded through the settlement, and a site arranged for school and church at the most central point.

"A somewhat paternal policy has been adopted by the Canadian Pacific in connection with the colonization of the vast area of land controlled by that corporation tributary to its system. The company is the largest landowner in Canada, and has incurred enormous expenditure in the construction of irrigation works to further enhance the productiveness of its lands. The company is vastly concerned in the success of every individual purchaser or settler, who at once becomes a patron of the road.

"The company realizes that the bulk of the settlers coming into occupation, particularly upon its irrigated lands, will be more or less ignorant of the proper methods of handling and applying water and of Western Canadian farming practice generally, and it therefore places at their disposal advice and assistance through its own staff of lecturers and experts. The company also operates at central points farms devoted to demonstrating the agricultural possibilities of the irrigated tract. On some of these farms are maintained pure-bred sires for the free use of the settler, and advanced work is also being done in seed selection and distribution. The company distinguishes between mere land-selling and advanced colonization and development work, and realizes that a somewhat paternal administration accelerates the results the company are striving for—viz., the greatest possible volume of traffic in the shortest possible time.

"Considerable detail has as yet to be worked out by the company's officers before it is possible to deal definitely with the financial phase of the scheme. Indeed, it may be expected that the preliminary programme will be considerably amended after we commence active operations on the new plan and have an opportunity of studying the class of colonists we shall be dealing with. It is at present expected that the holdings will vary in area from 80 to 160 acres. In some cases they may be slightly larger. The prices at which the company's lands are at present disposed of vary from $15 to $40 per acre. It would perhaps be safe to estimate the land value of the average holding at from $3,000 to $3,750. It is estimated that the cost of erecting the necessary buildings, placing other improvements on the land, breaking, seed, &c., will amount to about $1,500. To this extent the company proposes to bear the entire financial burden on a 10-year repayment plan.

"The settler's own capital might advantageously be expended as follows: For the purchase of the necessary live stock, $500; for furniture, household expenses, and horse feed, about $125; one-half the total cost of implements (the balance being repayable to the dealer at a future date), $250; transportation to Canada, about $125—or a total of $1,000.

"It is perhaps fair to state that, realizing the enormous importance of the individuality of the colonist, the company proposes, in working out the detailed administration of the new project, to exercise due care and judgment in the selection of the settlers, so as to eliminate, as far as possible, the incident of failure. Decided preference will be given to married men with families. The company feels that while a man may be laboring under a handicap during the first struggle when settling in the ordinary way in a new country, with the facilities offered under the company's project a settler's family would be of great assistance to him. The project is practically an invitation to approved colonists with agricultural experience to go into partnership with the Canadian Pacific, and it would be poor business judgment indeed if that corporation did not exercise care in the selection of its partners.

"I might here add that it is intended that the colonists shall be accompanied on their trip to Western Canada by one of the company's officers, who will remain there until each party is comfortably settled; and the company's staff at headquarters will, of course, be available to render every assistance in locating the various parties as quickly as they arrive.

"To put the case in concrete form, the main features of the company's plan are:

"1. That a home may be ready for the settler and his family immediately on his arrival in Canada.

"2. That all the preliminary work to make the farm productive at the earliest possible moment will have been performed prior to his arrival.

"3. That the company will augment the settler's capital by practically making him a loan, to be expended by the company, in providing necessary improvements."

COMMENTS ON THE ELECTRIC RAILWAY SITUATION.*

BY EDWIN S. WEBSTER, OF THE FIRM OF STONE & WEBSTER, BOSTON.

The problem of securing an adequate revenue from passenger fares appears to be the most serious issue now confronting the electric railway industry. In the early days of electric transportation the 5-cent fare unit was, on the whole, appropriate to the standards and cost of service rendered. The rolling stock was composed of small, light cars, usually of the single-truck type; the speed of operation was relatively low; the power demands per car were moderate; the cost of labor and materials was far below present figures; comparatively light roadbed, track and line construction met the requirements of the traffic, and the investment per mile of track varied from one-half to one-sixth that of the present, depending upon the size of the community served and other local conditions. Even in the larger cities the transfer facilities were greatly limited, and the average haul per passenger was much shorter than to-day.

The standards and costs of service now rest upon an entirely different plane. The expansion of city systems into suburban territory has raised the average length of haul independently of other causes. The transfer situation has become serious, through its extension beyond reasonable limits. The purchasing power of the nickel from the standpoint of the passenger has greatly increased. From the point of view of the operating company, however, the nickel pays for the conduct of considerably less transportation and for the maintenance of less service and equipment than a few years ago. The cost of power has been reduced to some extent by improved technical administration of generating and distributing equipment, but not enough to offset the enlarged demands of heavier cars operated at increased speeds. The growth in the size and weight of cars has increased the rolling stock investment account and necessitated the expenditure of large sums of money for physical plant, including heavier track and more permanent roadbed construction, multiplied capacities in power stations and lines and enlarged facilities for the economical maintenance of equipment. The advances of the past few years in the cost of labor and material have placed a premium upon new construction work and have narrowed the margin between receipts and expenses. Under the early conditions, average fares of from 1 to 1¼ cents per mile enabled the companies to make progress; to-day these returns are insuffi-

*From the annual statistical number of the *Electric Railway Journal*.

cient to provide a reasonable dividend in many properties and maintain the most modern standards of service. The increased length of ride now possible upon a single fare of 5 cents makes it difficult for the larger city properties to earn a reasonable dividend, and only in a less degree does this condition bear upon the companies of smaller size. The relatively great density of traffic in the larger city is insufficient to offset the burdens of the transfer, the extension of lines into outlying districts and the rising cost of operation.

In the larger cities there must be some change in the transfer situation in order to secure a fair return to the companies. Scientific administration of properties is insufficient to meet the rising costs of service rendered to the traveling public. The average haul per fare must be reduced, through the restriction of the transfer privilege or the imposition of some sort of a charge for transfers issued. The policy of selling fares at reduced rates must be closely scrutinized, and in many instances abolished. The fare unit in itself will have to be raised to 6 cents or over in cases where it is clear that a line cannot be operated with reasonable profit on a 5-cent fare basis, or else the fare zones will have to be shortened. Otherwise, a line honestly capitalized will have to reduce its capital to a point below the actual investment in the property. Denial of a reasonable return upon a proper investment and insistence on the highest standards of service closely approach confiscation. The maintenance of a reasonable return through adequate fares and controlled transfer situations, through economical administration and a liberal executive policy is to the advantage of the public as well as of the companies, for in the last analysis the cost of an unsuccessful utility operation and the benefits of a profitable public service fall upon the community supplied with facilities. So long as present fare limitations apply, the expansion of existing systems and the development of new enterprises can only be retarded.

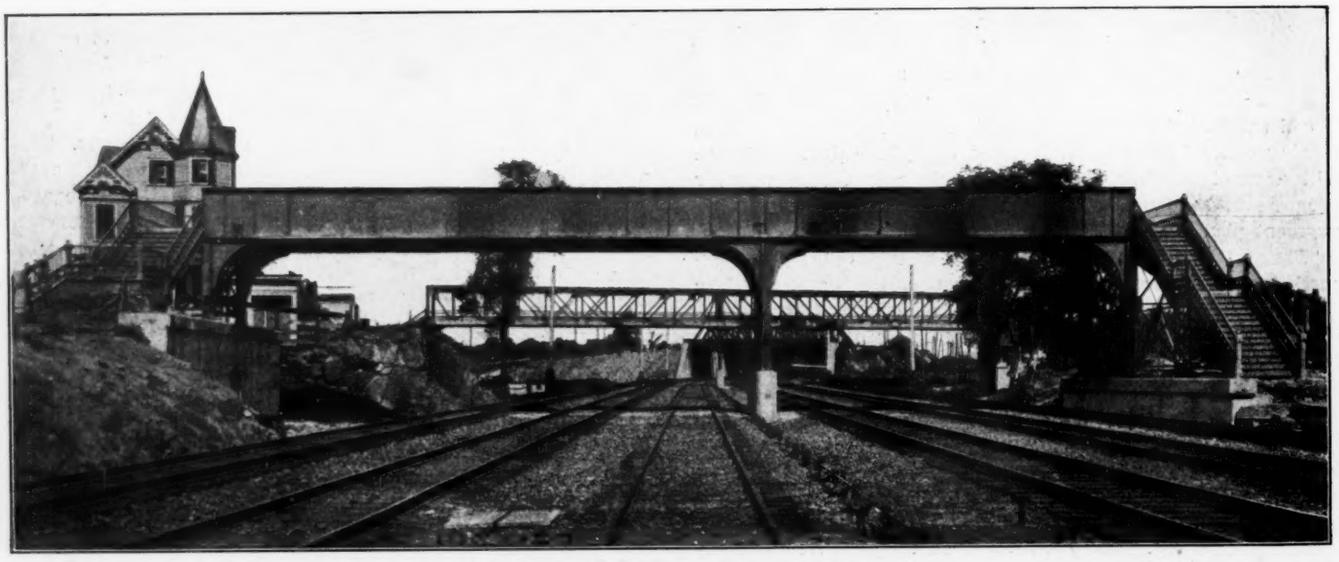
HARLEM RIVER BRANCH IMPROVEMENTS; NEW YORK, NEW HAVEN & HARTFORD.

The Harlem river branch of the New Haven runs from New Rochelle, N. Y., on the main line, southwest 11 miles to the Harlem river freight terminals at Willis avenue and East One Hundred and Thirty-second street, New York. This line has been used almost entirely for freight business, although there is local passenger traffic, and a few through passenger trains for Washington and the South are operated over it. The freight carried is that which is to go west and south over the railways having terminals near New York, as well as the Long Island Railroad. The cars are transferred on car floats to the water terminals of the various roads; about 2,000 cars a day are transferred in this way.

The branch has had four tracks for several years. In 1904 it was decided to six-track it and also abolish all grade crossings. The additional tracks will be needed not only to handle present traffic comfortably, but to take care of the additional traffic which will develop when the New York Connecting Railroad, owned jointly by the New Haven and the Pennsylvania Railroad, builds the all-rail line from the Harlem river station south over Hell Gate to Long Island City, connecting with the Long Island Railroad and the Pennsylvania tunnels. The Harlem river branch will eventually be electrified.

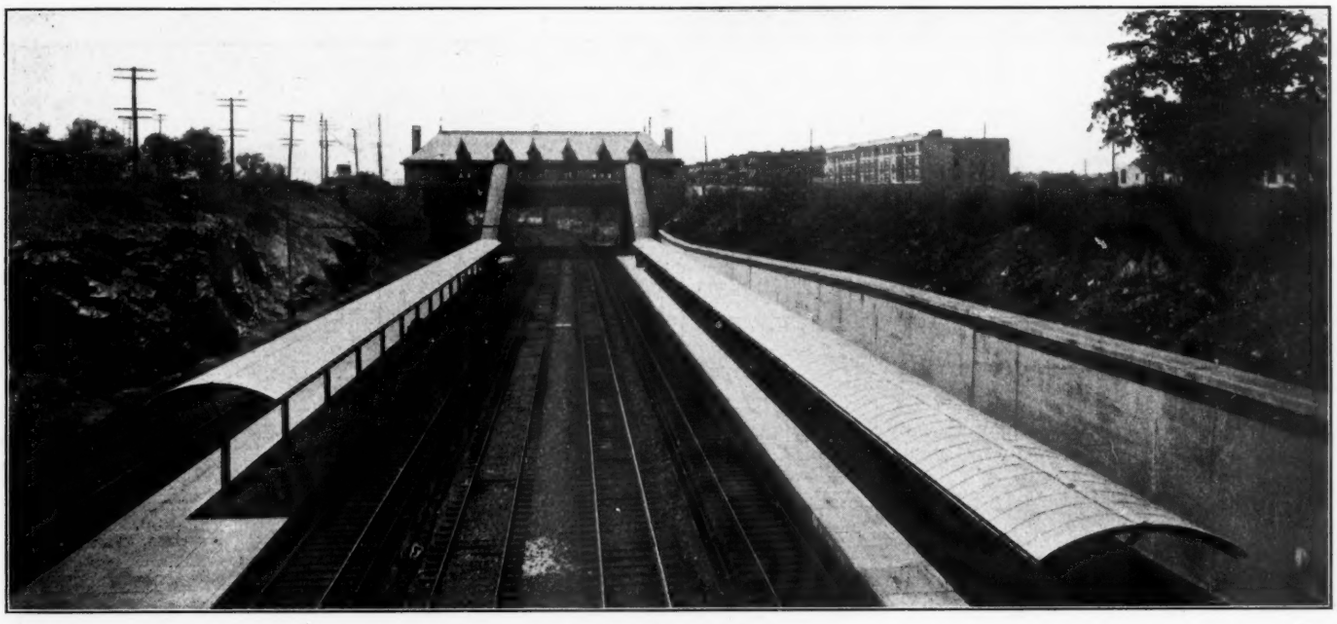
Scherzer Spans over Bronx River.

About two miles of the line is outside of New York City. The bridges carrying the load over streets on this section have open floors, with ties resting on the top flanges of deck girders or on stringers of half-through girders. They are designed to carry a load, on each track, of two 200-ton consolidation engines, followed by a train weighing 5,000 lbs. per foot. The clearances require that girders be comparatively shallow, resulting in heavy flanges to get the necessary section. For



Foot-Bridges at Taylor and Garfield Streets.

Unionport Road.



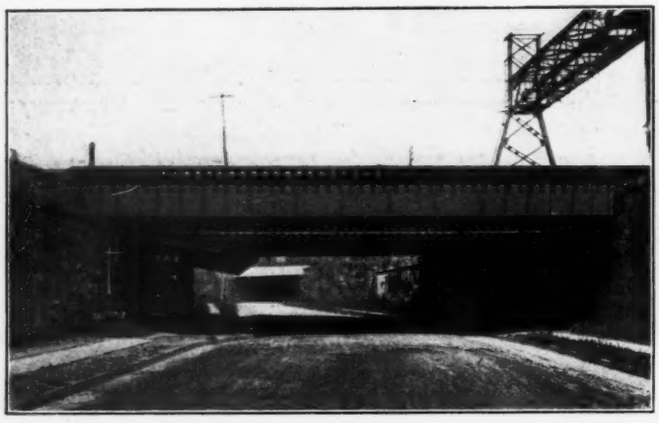
Hunts Point Station.

Bear Swamp Road.

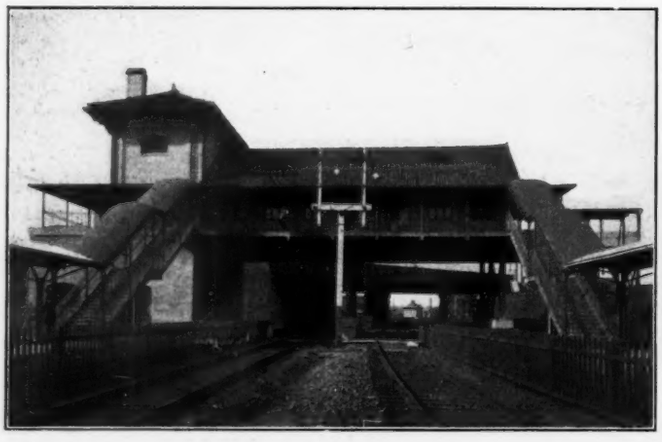
half-through bridges, there are seven girders, spaced 13 ft. on centers. The floor-beams, usually about 10 ft. apart on centers, rest on the lower flanges of the girders. The stringers, which are 6 ft. 6 in. on centers, are riveted between the floor-beams, running on the bottom flanges of the latter.

The bridge over the Boston Post Road, near Woodside station, shown herewith, is an example of a half-through girder bridge. It rests on trestles close to the curb lines of the street, making a center span of 79 ft. 2 in. with 19-ft. stringers over each sidewalk. This bridge crosses the street at an angle of about 33 deg. The trestle posts are built up H sections, latticed. Between the posts are rigid sway frames. The trestle caps have two 40-in. webs, designed to take the load of the stringers and floor-beams. Each web is stiffened by inside angles where the girder or stringer crosses the web, and diaphragms or cover plates are placed under the stringers and floor-beams so as to distribute the load equally between the two webs.

The Pelhamdale avenue bridge has a similar trestle, but the sway frames are omitted.



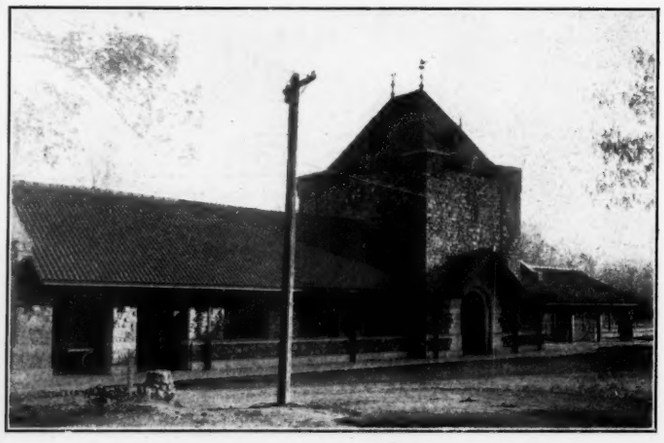
Webster Avenue.



Westchester Avenue Station.

Boston Post Road, Woodside.

Baretto Street.



Pelham Manor Station.

Pelham Lane.

Within the limits of New York City it was required by the city that bridges have watertight floors, and there were other restrictions making it necessary to use fully ballasted tracks. The Bear Swamp road bridge is typical. This bridge carries the track on a 30-minute curve across a 100-ft. street at an angle of about 41 deg. The girders are supported on

Port Morris Station.

Pelhamdale Avenue.

Port Morris Crossing.

the abutments and on three trestles, one in the center of the street and one near each curb line. Through flooring is used, the troughs being spaced 2 in. on centers. They are built up of 12-in. vertical webs and 12-in. channels and cover plates. The troughing rests on shelf angles riveted to the girders 4 in. above the bottom flanges. The troughs are filled with concrete, leaving a smooth surface for a 2-in. layer of waterproofing on which the ballast is put.

The Eastchester road bridge is similar to the Bear Swamp road bridge, except that it is skewed the other way and made to carry the tracks in groups of four and two, the tracks being spaced for an island station. The Pelham Lane bridge is of similar construction, in general, to the other half-through girder bridges. This bridge, however, was subject to the approval of the commissioner of parks, who required that steel mask girders be added on each side, giving the effect of three arches appearing to rest on cast iron columns, in line with the trestles, and on columns bolted to the face of the abutments. This mask was made very light and the space between it and the main bridge girders enclosed with plates, which can easily be removed for inspecting, cleaning and painting the structure.

Eastchester Road.

(*To be continued.*)

TRANSPORTATION AND TRAFFIC IN BELGIUM.

BY LOGAN G. MC PHERSON,
Traffic Expert with the National Waterways Commission in Europe.

The area of Belgium is 2,945,502 hectares, or 11,373 square miles, about equal to that of Maryland and Delaware combined. The population in 1831 was 3,785,814, in 1907 7,317,561. The country does not produce enough of food stuffs to supply its people or of raw material for its manufactures, the major portion of which must find a market in other countries. To but a small extent does the traffic of Belgium with other countries move by rail, the food supplies and raw material coming in and manufactured products going out through the one port of Antwerp, which, therefore, focusses all the avenues of transportation, both the waterways and the railways. Grain from Russia and America comes in through Antwerp; grain from Hungary is loaded at Trieste on vessels which bring it to Antwerp. Cotton and other materials from America, as well as certain machinery and other merchandise from England, America and other countries are imported through Antwerp, and through this port the laces and other fabrics, the glass, pottery, rifle barrels and machinery of Belgian manufacture go out.

The rivers of Belgium are the Scheldt, which flows into the North sea, its broad mouth permitting ocean ships to ply to and from Antwerp, and the Meuse, which flows from France through Eastern Belgium by the city of Liege, and thence through Holland by Rotterdam to the sea. These rivers to but a small extent supply the transportation needs of Belgium, neither of them being available for deep-sea transportation very far inland, and they offer no special advantages to attract industries to their banks. The coal fields of Belgium are to the south, where have arisen the manufacturing towns of Charleroi and Mons; and in the southwest where is the manufacturing center of Liege. The heavy products of Belgium come from these three cities, Brussels, Ghent and other centers producing for export laces, gloves and kindred products that are high in value and light in weight. At Verviers, from wool imported from England and Australia and cotton from America, is made cloth, which is exported to England, and, in lesser quantities, to America. The manufactures of the other cities of Belgium are furniture, and the simpler articles of general use, which are sold in local markets.

It follows from the geographical configuration, the industrial characteristics, and the political boundaries of Belgium that a transportation system to supply its needs must provide for the conveyance of raw material from Antwerp to the places of manufacture, and of manufactured products therefrom to Antwerp for export; of coal from the mines to the manufacturing centers and throughout the kingdom for general consumption, and likewise from place to place within the kingdom of cement, brick and wood. The traffic in the higher grades of merchandise between place and place in Belgium is small. Local tailors make the clothing for the men, the women the clothing for themselves and their children; the people, as a whole, being exceedingly industrious, the old time self-sufficiency of the household being preserved to a greater degree than in nearly any other of the countries of modern civilization. The households in the smaller towns and the country raise their own truck in their small gardens; the larger towns and cities are supplied by truck farmers who bring to the markets by hand-cart, by donkey-cart, by wagon, and by tram-car the produce from within a limited radius. In the smaller towns and the country the lower classes eat but little meat. Brussels and the larger cities are well supplied with fish brought by quick train service from the North sea. There is a limited movement into Belgium of fruits and vegetables from France and from Northern Italy.

In 1830, at the time of the contest with Holland that resulted in the attainment of national independence by Belgium, there were in this state 1,618 kms. of inland waterways, 10 per cent. of which belonged to the government, 64 per cent. to provinces, 7 per cent. to communes and 19 per cent. to concessionaries. In 1840 there were 1,707 kms.; in 1850, 1818 kms.; in 1860, 1,919 kms.; in 1870, 1,976 kms.; in 1880, 2,022 kms.; in 1909, 2,077 kms., or 1 290 miles. Since 1870, 83 per cent. have belonged to the state, 7.5 per cent. to provinces, 4.5 per cent. to communes and but 5 per cent. to concessionaries. It will be perceived that the waterways have extended but little more than 300 kms., or 186 miles, since the building of railways really began, and that their length is practically the same today as it was thirty years ago, the small extension made during that time having been principally to afford connection

here and there between one waterway and another. Many even of the existing canals were constructed primarily for drainage, but the waterways that are navigable form a network throughout the kingdom, over which the greater quantity of the raw materials and a considerable proportion of the manufactures are conveyed. In 1905 the total ton miles were 708,361,000, of which 27.7 per cent. were coal and coke, 18 per cent. building materials, 17.5 per cent. agricultural products and 12 per cent. industrial products, including pottery and glass.

In the southwest the traffic of the waterways arises principally from the French and Belgium coal fields; in the northeast from the large cities and industrial districts; and much traffic moves on the waterways connecting Rotterdam and Antwerp with the Rhine.

From the first tolls have been charged for the use of the waterways. They have been reduced and standardized at various times and are now very small. The boats charge what they please for transportation, the boat owners or brokers in their behalf bidding for traffic on the floor of the Antwerp Exchange. In nearly every case the boat is navigated by the owner and his family, who live upon it. The boatmen make somewhat more money than the ordinary working man, but never a very high profit. These men are helped by an association, which under a government law is permitted to loan money on mortgage on a boat after it has been built. Because of a certain movement of traffic on the inland waterways between France, Holland and Belgium there is an agreement as to the size of the boats in order that those of either country may go through on the canals of another. In 1904 were registered in Belgium 9,370 boats, in 1908, 10,779, with capacity ranging from 70 to 500 tons. Although of recent years the waterways have not been extended, they have been well maintained and improved, the government annually expending large sums of money for this purpose. The capital expenditure on these waterways has been from $55,000 to over $450,000 a mile, the total to 1905 being $79,050,000. The average annual charge for current improvements and maintenance is $445,000. The receipts for 1905 were $400,000. If to the deficit in meeting the current expenditures for that year be added interest on the capital at 3½ per cent. or $2,766,750, it is found that the total charge borne without offset by the State of Belgium on account of its waterways for the year 1905 amounted to over $2,800,000.

The first railways in Belgium were built by the state. In 1835 was opened the first line, that from Brussels to Malines. The state continued in the construction until about 1840, but their operation yielded so little profit that charters were granted to private companies for the construction of further railways that were needed.

The rates of the state railways from the first were specifically fixed on a definite basis. The charters of the private railways specified a maximum, and the rates of these railways were for some time in some places higher than those charged on the railways operated by the state, but the private companies after a time found it advisable to adopt the same tables of rates as the state—that is, the same nominal scale prevailed over both systems. This was partly brought about by a popular complaint that the private roads were not as accommodating as those owned by the government, that they did not make the same efforts to serve the poor people, but bent all their energies to securing as high profits as possible. Certain it is that their returns were far greater than those operated by the State. As they could do but little in the way of increasing traffic by a reduction of the rates, it was but natural that they should charge as much as they could, and should keep down the expense of operation. This they were so successful in doing that their operating expenditures were markedly less than those of the state roads.

The state owned and the privately owned lines found themselves in vigorous competition. Especial rates were accorded individual shippers and preferential contracts made of one kind and another by both systems. This situation was an important factor in causing the Belgian government to enter about 1870 upon the purchase of the private lines. Another factor was the difficulty of transportation over routes formed in part by state and in part by private lines, obstacles in the way of transhipment arising at the junctions and causing delay in the movement of traffic. The government also feared that the privately owned railways might be purchased by foreign financiers, especially those of Germany, and that political complications would ensue.

When it is considered that the government now owns all the railways with the exception of less than 300 miles and practically all of the waterways, and it does not allow the railways to compete with the waterways, and that the longest distance for which rail rates are quoted in Belgium is a little more than 300 kms. or less than 200 miles, it is evident that the rail rates for the Belgian local traffic can be maintained upon a symmetrical mathematical basis. These rates are seldom changed. Certain exceptions to the formal traffic are made on import and export traffic to protect the Belgian ports against foreign competing ports of the North sea. For example, special rates are made on coal from the Liege district, which is contiguous to Germany, in order that it may move out through Antwerp instead of going through Germany to the sea. In local service a rate cannot be advanced except upon three months' notice, but a rate can be reduced upon notice of a fortnight.

In 1880 the length of all of the Belgium railways was 4,112 kms., in 1900, 4,552 kms., in 1907, 4,562 kms., or 2,828 miles. The total capital expenditures in 1905 for the government lines were Frs.2,295,000,000, or about $459,000,000. For many years the operation of the government railways showed a deficit, but recently they have produced a surplus that averages throughout the entire period a return of over 4 per cent. on the capital. In 1906 the gross receipts were Frs.259,336,991; the expenses were Frs.251,919,949, which, deducted from the amount of the gross receipts, leaves a profit of Frs.7,417,042.

In 1880 on the government lines were 1,281 locomotives and 36,150 freight cars; in 1900, 2,744 locomotives and 66,060 freight cars, and on the private lines 283 locomotives and 6,703 freight cars. The capacity of the freight cars is from 10 to 15 tons. A few cars of 20 tons have been tried, but these are larger than the requirements of the consumers, which—the manufacturing establishments included—are not equipped for the reception or the loading of cars of even this capacity.

The traffic statistics show that in 1907 were carried on all the Belgian lines 71,407,230 tons of heavy freight, the kind ordinarily carried by the waterways. In addition to this were 695,262 tons of light freignt, together with horses and cattle, and certain other traffic not rated by the ton.

The present classification of freights has endured for more than thirty years.

Tariff No. 1 is for light package freight, carried usually on passenger trains; this corresponds to the express traffic of the United States.

Tariff No. 2 (quick service) is for shipments of 200 kgs. or less. Packages weighing up to 60 kgs. (132 lbs.) and which are paid on departure by means of railways stamps, are transported from one point to another of the kingdom at prices varying from Frs.0.50 to Frs.1.10, according to the weight; those that are prepaid are submitted to a tax varying from Frs.0.70 to Frs.1.30.

Shipments weighing from 60 kgs. (132 lbs.) to 200 kgs. (440 lbs.) are taxed according to weight and distance.

The rates for 100 kgs. (220 lbs.) are the following:

10 kilometers....1.00 frs	100 kilometers.....2.70 frs.
50 kilometers....1.80 frs.	300 kilometers.....4.90 frs.

Tariff No. 3 (petite vitesse) is applicable to heavy goods shipped by ordinary goods trains. It includes four classes.

The first class includes less than carload shipments above 200 kgs. (440 lbs.), as well as carload shipments of merchandise delegated to this class in the table of classifications, such as copper boilers, printing type, furniture, tinware and machinery. The rate is Frs.10.60 for 100 kms. and Frs.21.60 for 300 kms. The second class embraces notably polished iron and old machinery, the rate being Frs.8.00 for 100 kms. and Frs.12.50 for 300 kms. The third class includes notably melted iron and iron in bars, beaten, laminated or drawn, but not polished, paying Frs.6.25 for 100 kms., and Frs.8.50 for 300 kms. The fourth class includes cast iron, coal, rough stone, bricks, and fertilizers, etc., paying Frs.4.50 for 100 kms. and Frs.6.50 for 300 kms. Under this class of Tariff No. 3 is moved the great bulk of the freight.

Tariff No. 4 includes gold and silver, coin and bullion, which is moved at rates that vary with the value of the shipments.

Tariff No. 5 concerns shipments of horses and cattle, which are charged either per head or per wagon. An ordinary car load of ordinary cattle will pay Frs.51.50 for 300 kms.

Tariff No. 6 includes the ordinary road vehicles, carriages and wagons.

The rates given above cover both the transportation and the terminal service. The railway employees load and unload less than carload shipments of tariffs 1, 2 and 3. For shipments of tariffs 1 and 2 the costs of handling are included in the rate. For merchandise of tariff 3, less than carload shipments, a charge of Frs.0.10 per 100 kgs. is made for loading and unloading; shipments of the other classes are loaded and unloaded by the shippers and the receivers.

These classifications and the rate structure as a whole are less complicated than those of the United States, but they doubtless suffice for the traffic of a people of simple needs, living within a small area. For the local and mixed Belgian traffic there exist numerous special tariffs and exceptional tariffs applicable to raw products of great necessity, such as coal, minerals, stone, castings, fertilizers, agricultural products, etc. Special tariffs apply furthermore to import and export traffic that moves in full carloads.

It has been perceived that the freight tariffs are upon a tapering kilometric basis. The passenger tariffs are upon an exact kilometric basis, the rates regularly increasing with distance.

The one-way rate for first class traffic is 9.4 centimes per km., that for second class traffic 6.4 centimes per km., and that for third class traffic 3.8 centimes per km. Return tickets are sold at 20 per cent. reduction from double the one-way fare; they are good for two days, Sundays and holidays not being counted. Where there is commutation traffic season tickets are sold. Special tickets are sold for the commutation travel of working men, good during the week for six days or for seven days as may be desired. For the accommodation of working men, who leave their homes on Monday and do not return until Sunday, one return ticket is sold. For certain kinds of travelers are reduced rates. For instance, a reduction of 50 per cent. is accorded for children from three to eight years of age (children of less than three years are carried free of charge), for soldiers, for emigrants, for regularly organized associations of at least 20 members, for the scholars of established schools, traveling at least 10 in number and with their teacher, for workmen employed temporarily outside of the frontiers and for excursion trains.

The first and second class tariffs apply to different compartments in the same car, which afford very nearly the same accommodation, the only difference being, so far as a casual observer can tell, in the color of the upholstery, and even that is not always a definite indication. The third class tariffs apply for travel in compartments usually in separate cars, which are fitted with wooden seats. The workingmen's tickets cover travel in what would be considered as little if any better than freight cars in the United States.

An extraordinary arrangement, the like of which probably exists in no other country, is that under which a person can buy a ticket for Frs.61.50 first class, Frs.41 second class or Frs.23.50 third class, which will allow him to travel at will over the entire Belgian railway system for a period of 15 days. This concession brought an outcry from the poorer classes, who said that they had but a short holiday each year and should be granted a corresponding concession of which they could avail. This led the Government to concede tickets at Frs.30.75 first class, Frs.20.50 second class and Frs.11.75 third class, which give the purchaser the run of the entire Belgian Railway System for a period of five days.

The framework of the Belgian tariffs has been set forth in some detail because these tariffs have been held up as models of simplicity which the railway managers of the United States would do well to emulate. These railway managers of the United States may with equal propriety point out that a still simpler system of charges was that of the old-time wagoners, who charged so much by the cubic foot for articles light in weight and so much per one hundred pounds for articles heavy in weight per twenty miles. It may not be an exaggeration to say that the needs of the traffic of Belgium for a complicated rate structure no more exceed those of the days of the old stage wagons than the variety and complexity of the traffic of the United States exceeds that of Belgium.

It is evident that the commercial and industrial characteristics of Belgium are entirely peculiar. Were it not for its import and export traffic the nation could not exist, and although there is connection by canal between Ostend on the North sea, Bruges and Ghent, it has really but the one port of Antwerp. This is connected by both rail and canal with the regions to which the imported commodities need to be carried, and with the manufacturing cities where the export traffic originates. The industrial plants, which do not in any place consume raw material or turn out manufactured product in anything approaching the quantities characteristic of the great manufacturing establishments of the United States, have their transportation needs apparently well enough supplied by the existing railways and waterways. Notwithstanding this, the prominent and progressive business men of Belgium condemn the increasing expenditure of vast sums upon the waterways, and severely criticise the management of the railways, which they say impedes their development along lines of greater service to advancing industry.

These prominent and progressive business men of Belgium have formed themselves into a Superior Committee of Industry, which is charged with the study, the analysis of all matters pertaining to the commercial and industrial development of the kingdom. From an officer, than whom none stands higher in the councils of this committee, was obtained the free and frank expression of its opinion that, while the canals serve for the movement of heavy traffic to meet the present needs, it will be folly to expend considerable sums for their extension, as the railways can be developed to the more efficient performance of the service; that the desire to make Brussels a seaport is a dream, its practical realization meaning the expenditure of a sum so vast that the government would better transport the freight moving between Brussels and Antwerp free of charge, as the expense necessary for this purpose would probably not equal the interest on the investment required to expand the canal for the accommodation of large ocean-going steamers.

Steamers of small capacity now ply, however, between Brussels and London, and tramp vessels of considerable capacity sometimes come to Brussels. The popular desire for the extension of the canals arises from the feeling of this town and that town that commercial prosperity would surely come to it if it had water transportation or increased water transportation, a feeling that doubtless in great measure is inspired by the fact that the great cities of the world, for the most part, are on great water highways. This

popular desire finds expression in Parliament, whose members are always sensitive to the wishes of their constituents.

By this Superior Committee of Industry the conduct of the railways is criticised as being notoriously inefficient. They are administered by government officials, who have permanent tenure of their offices, and, therefore, little care whether the operation produces a surplus or a deficit. These men have no incentive to pursue economies in practice, but are notoriously wasteful in their expenditures, erecting structures that are not at all designed to meet the needs of the future, and employing a far greater number of men than are necessary. As the government has come into the ownership of private railways it has increased the number of employees three to one. The routine of the administrative offices is enveloped in red tape. For example, the dropping of a lighted match on the floor of a storehouse of employees' uniforms started a destructive fire. A board of investigation instituted a series of hearings, of which eleven have been held at this writing. Notwithstanding that the cause of the fire and the extent of the damage were readily ascertained, the hearings continue.

This Superior Committee of Industry, as well it may, regards the rates of the Belgian railways at present as satisfactory in the main to the industrial and commercial interests of the country, but it foresees that the wasteful extravagances of the operations will, if not checked, result in the course of a few years in a deficit so large that there will be forced an increase in the rates that will be injurious to the business interests.

GOVERNMENT RAILWAY CONTROL IN MEXICO.

BY E. H. TALBOT.

On the 26th day of December, 1906, the Mexican Congress, by formal act, authorized the "taking over and uniting of the properties of the National Railroad Company of Mexico (already practically controlled by the government since 1902) and the Mexican Central Railway Company, Limited," and the deed incorporating the new company, now known as the "Ferrocarriles Nacionales de Mexico" (Northern Railways of Mexico), was finally executed on the 28th of March, 1908; but the actual transfers of the properties were not made until January 1, 1909, for the National Railroad Company of Mexico, including the Hidalgo & Northeastern Railroad Company, Limited, and February 1, 1909, for the Mexican Central Railway Company, Limited. The purpose of this important move by the Mexican government, as stated by Minister of Finance Limantour, in a carefully prepared report to the Congress in November, 1908, may be briefly stated as:

1st. To prevent the possible absorption of the properties named, at some future time, by one or more of the great transportation systems of the United States.

2nd. To insure greater efficiency and a financial reorganization of the two companies which will render possible important extensions necessary to the proper development of the country's natural resources.

3rd. To relieve the Mexican Central Railway of financial embarrassments which had existed for several years and were "growing daily worse and worse," exposing it to the cupidity of any individuals or corporations that might aspire to its possession.

4th. To bring about more economical management and operation, with a view to the interests both of the stockholders and of the public.

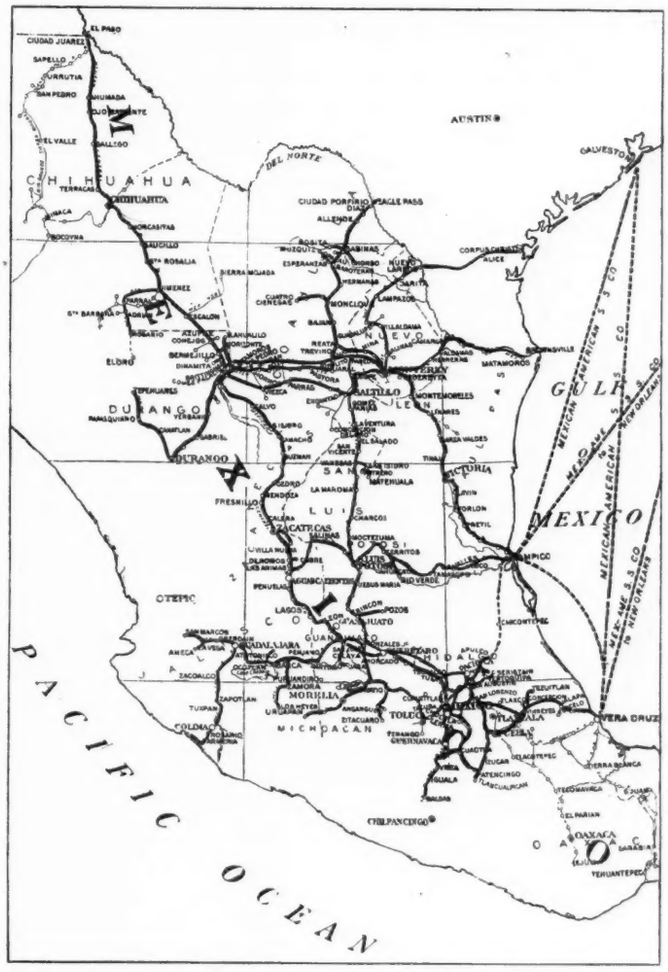
5th. To put an end to rivalries which were diverting vast sums from the "penetration of new territory and the betterment of existing lines" to "the wresting of traffic from other companies or the acquiring of lines already constructed."

6th. To reduce general expenses, cut down the list of high-salaried officers, compel the routing of traffic over lines the physical conditions of which are the most favorable to economical operation, insure the most effective use of rolling stock, the compact loading of freight and other like purposes.

7th. To render possible the securing of funds with which to "repair and improve the roads, to purchase needed rolling stock and to undertake the construction of new lines.

Broadly and in general terms, the purpose of the Mexican government in adopting the policy of national control of its railway system, as stated by Minister Limantour, "does not aim at absorbing all the railways," but simply at securing the greatest possible efficiency of the country's transportation facilities, the certain and permanent protection of owners and patrons alike, the uninterrupted continuance of the era of commercial and industrial development inaugurated by the Diaz régime more than a quarter of a century ago, and of "non-intervention in the economic and political life of the nation."

That the reader may better understand and appreciate the



National Railways of Mexico.

importance of the two great railway systems, including their leased and controlled roads covered by this much-discussed "merger," it should be stated that they involve a total mileage of 7,075 miles of main line and branches as officially reported in June of last year, and extend from Laredo, Eagle Pass and El Paso, Texas, to Mexico City, serving the important cities of Chihuahua, Torreon, Zacatecas, Aguascalientes, Guanajuato, Leon, Queretaro, Monterey, Saltillo and San Luis Potosi; from Monterey to Matamoros and from Monterey to Tampico; from San Luis Potosi to Tampico; from Mexico City to Toluca, Morelia and Uruapan; from Mexico City to Pachuca and Cuernamca and Balsas, also to Puebla, Jalapa and Vera Cruz; and from Irapuato, on the Central division, to Guadalajara and Manzanillo.

These cities constitute only the more important points reached.

The total number of stations maintained exceeds 1,200; and the states penetrated include Chihuahua, Zacatecas, Aguascalientes, Guanajuato, San Luis Potosi, Queretaro, Jalisco, Mexico, Durango, Colima, Nuevo Leon, Michoacan, Coahuila, Tamaulipas, Morelos, Hidalgo, Veracruz, Puebla and Tlaxcala, to which must be added the Federal District, in which the national capital is situated.

That the control of a system of communication so far reaching and favorably distributed, will enable the government to dominate the railway business of the republic for many years to come, without necessitating the purchase of another mile of existing or contemplated track, cannot be doubted. That the power acquired under the terms of the "merger" will be used wisely, and for the best interests of all concerned, is equally certain. Every consideration based on fact or reason would lead to this conclusion even if the government had not in so many words given assurance that it "would not make indiscreet or arbitrary use of the dominant position which the control gives it."

At the time of the proposed merging of the properties the capital stock of the National Railroad of Mexico consisted of the following securities, of which about 47 per cent. had been in the hands of the government since 1902:

	Authorized.	Issued.
Preferred stock	$32,000,000	$28,832,925
Second preferred stock	22,233,333⅓	22,030,600
Deferred stock	11,116,666⅔	11,015,300
Common stock (old)	.....	304,100
Total issued		$62,182,925

The capital stock of the Mexican Central Railway consisted of common stock, authorized, $100,000,000; issued, $59,127,100.

Total capital stock issued by both companies, $121,310,025.

The total "prior lien" bond issues called for by law or agreements with bankers amounted to $231,000,000, of which sum $129,500,000 was to be used for the immediate exchange of bonds and other securities of the two companies named, and as a reserve to be tendered later in exchange for other securities, and to be sold to meet expenses of incorporation, repairs and betterments; $47,500,000 to be issued after January 1, 1910, for betterments and equipment, at the rate of $2,500,000 annually for 19 years; $38,000,000 for constructing or acquiring additional lines; $10,000,000 for building the proposed short line from Tampico to Mexico City, and $6,000,000 to take up and retire bonds of the Mexican International Railroad Co., if deemed "advantageous."

Another issue, known as "general mortgage bonds" and amounting to $186,000,000 is to be used as follows:

To be exchanged for bonds of old companies and to provide cash resources	$85,500,000
For betterments and equipment, after January, 1910	49,500,000
For building or buying other lines	19,000,000
For Tampico Short Line and for building bridges	6,000,000
To take up bonds of the International Railroad	26,000,000
	$186,000,000

Of the $230,000,000 stock of the National Railways of Mexico the government holds $115,023,590.

The National Tehuantepec and the Veracruz & Pacific lines were omitted from the merger because already the exclusive property of the nation. The Interoceanic Railway of Mexico (an English corporation) was also left out of the actual merger because it was already controlled by the National R. R. Co. of Mexico, which company acted as manager of the property. The Hidalgo & Northeastern, the Coahuila & Pacific, the Mexican Pacific and several other and less important roads which were controlled either by the National or the Central are also part and parcel of the "merger." Add to these the Mexican Southern, recently leased by the Interoceanic, and extending from Puebla to Oaxaca, a distance of 228 miles, and from Esperanza to Tehuacan, 32 miles, with 38 miles under construction beyond Oaxaca soon to be completed, and we have a grand total of 7,373 miles. This outline of the chief features of the two great railway lines of Mexico and of their consolidation into one system and their transfer to government control will give to the reader a basis on which to estimate the importance of this transaction.

But in this case government control must not be construed to mean government operation in the ordinary sense of the term, for the active management and operation of the merged lines are and will continue in the hands of experienced and thoroughly competent American executive and operating officials. Naturally, however, the rank and file—the station agents, despatchers, clerks, conductors, brakemen, engineers, firemen, track men and ordinary laborers—will be chosen from the native population so far as this can be done without detriment to the service. In fact, it is proposed to establish at once a number of schools for the instruction of Mexican employees in the duties of these positions. These will be located in Mexico City and at Gomez Palacio, Puebla, Jalapa, Chihuahua, Aguascalientes, Acambaro, Dona Cecilia, San Luis Potosi and Monterey, which are important division headquarters. Already one has been established at Guadalajara.

There will be no politics in the control of the National Railways of Mexico—at least, not for many years to come—only the safeguarding of their stockholders and the public, the preventing of ruinous competition, the securing of needed extensions and improvements, the creation and maintenance of desirable credit in the world's money markets, and the fostering of the country's commercial and industrial interests in every department of human activity. That it is succeeding even beyond the expectations of the government or the officers of the merged lines is amply proven by the results already achieved, which show a material advance in security values, a considerable decrease in operating expenses and a corresponding increase in net earnings, improved physical conditions, new financial strength and brilliant promise for the future.

A comparison of the earnings and operating expenses of the merged lines for the first six months under the new order of things, with those for the last six months under independent control, and a critical examination of the hundred and one other elements which enter into this new departure in the problem of railway control, leave no doubt of the wisdom of the Mexican experiment now being tried, and which is attracting much interest throughout the business and financial world. Only the canker of graft or the blight of political interference can possibly cause failure where now everything points to the most gratifying results.

It has always been the policy and the practice of the Mexican government to exercise a general supervision over the railways of the country through its "Department of Communications," in the interest of safety to life and limb and with a view to safeguarding the rights alike of stockholders and the public. In so far, therefore, as Mexico is concerned, the recent purchase of a controlling interest in the two principal railway systems of the country does not mean the adoption of a new policy, but the systematic and permanent enforcement of an old one. [It is generally understood that the actual merging of the properties was suggested to President Diaz by E. H. Harriman, who stood ready to take over the Mexican Central if the government did not exercise its option. —Editor.]

In Mexico there are more serious problems of railway operation and management than in the United States, and they require the best brains and most thorough and far-reaching experience in their handling. Fortunately, these qualifications were already at hand when the merger was consummated, and the government wisely utilized them in making up the first official roster of the consolidated system. Especially is this true of president E. N. Brown, vice-presidents D. P. Bennett and C. R. Hudson, A. Clark, general manager, and C. W. Fish, general freight agent, all of whom had long been prominently connected with the railway business of the country, are thoroughly familiar with local conditions and needs, and possess exceptional ability.

General News Section.

Alexander Johnson, who has been acting as consulting engineer, has been appointed chief engineer of the bridge department of New York City, with a salary of $10,000.

A fire, which occurred in the Erie yards at Jersey City, N. J., on January 21, destroyed the ice house and a tank of oil. The gas-house and office building were damaged. These were all frame structures. The estimated loss is $23,000.

Officers of the Baltimore & Ohio Southwestern and the representatives of the telegraphers on the company's lines have agreed to a plan of arbitration of questions about wages, and have asked Messrs. Knapp and Neill to act as mediators.

According to a St. Louis newspaper, the Board of Public Improvements of that city, reporting on the subject of grade crossings, finds that the expense to the railways of eliminating all the grade crossings in St. Louis by depression or elevation of tracks would be $8,000,000.

The Rock Island Lines, in conjunction with the Missouri Pacific, have established through passenger service from St. Louis to Los Angeles, which materially reduces the time through. Through standard sleeping and tourist cars leave St. Louis daily at 12:20 p.m. over the Missouri Pacific and at Kansas City are attached to the Rock Island's California special, leaving at 10 p.m. The time between St. Louis and Los Angeles is 69 hours. These trains have dining cars the entire distance.

Col. J. S. Taylor, special agent of the bureau of explosives of the American Railway Association, addressed the Traffic Club of Chicago on January 18. He gave steropticon illustrations of proper and improper methods of handling explosives and of disasters that had resulted from their improper handling. He said that 250,000 tons of explosives were made in this country in 1909, the greater part of which was transported by the railways. Every day an average of 6,000 freight cars are used in hauling these deadly materials. Effective legislation and the efforts of the American Railway Association have very greatly reduced the danger of accidents from this source.

The attorney-general of Texas has rendered an opinion interpreting the Texas statute which makes it unlawful for any railway to permit any conductor, fireman, engineer or brakeman to be on duty for a longer period than 16 consecutive hours. The railways require engineers and firemen to be at their engines 30 minutes before the time fixed for the departure of their trains. It is the duty of such employees during this 30-minute period to see that proper supplies have been placed on the engines, to oil the machinery, etc. The state labor commissioner asked whether, in computing the 16-hour period, this 30-minute period should be included. The attorney-general in reply referred to an interpretation which has been placed by the Interstate Commerce Commission on the federal 16-hour law, in which it is held that the employee goes on duty at the time he begins to perform service or at which he is required to be in readiness to perform service. The attorney-general finds that this opinion is reasonable, and, therefore, holds that under the Texas law the 16-hour term of service begins at the time the employee reports for duty under the rules or requirements of the company, and not when the train actually begins to move.

Telephone Train Despatching.

The Great Northern now uses telephones for train orders on 2,100 miles of its road, the Spokane division having lately been equipped. The Spokane division extends from Troy, Mont., to Leavenworth, Wash., 337 miles. On this division there are two despatching districts. Western Electric telephones and Gill selectors are used. The Western Electric has provided a testing switchboard which is installed throughout the Great Northern. This is a panel somewhat similar to the well-known telegraph peg switchboard, but containing telephone jacks and plugs. The circuits entering an office, both telephone and telegraph, are wired through these jacks and by the operation of two keys and using the plugs at the despatcher's orders it is possible to patch up a line in case of trouble, to interchange circuits, to locate a break or a cross to the nearest station—in fact, to make all the simple tests ordinarily required. These test panels have been found very useful and they are so simple that they may be operated by the most inexperienced. On the Spokane division 70 siding telephones are to be installed. With these the despatchers can take advantage of all changes in the movements of trains, prevent congestion and keep traffic moving; and the saving effected in one emergency will sometimes more than pay the cost of the installation. With the last installation the Great Northern wil have telephone train despatching lines the entire distance from Minneapolis to Seattle, with the exception of two short sections.

The Lehigh Valley is using telephones for train despatching on the Mahanoy & Hazleton division, the despatcher being located at Hazleton, Pa., and will soon use them on the Lehigh division, 54 miles, with 15 stations. On the first named division there are ten telephones at side tracks for use in cases of emergency. All the equipment is from the Western Electric Company. Gill main line bridging selectors are used for calling. The way stations have each a swinging arm with the transmitter and receiver mounted in a fixed position on a yoke. When the operator pulls the arm forward a switch closes the telephone circuit, and to talk he depresses a foot switch, which closes the primary circuit through the transmitter. A storage battery is used for operating the circuits and the despatcher's transmitters.

Disastrous Wreck at Webbwood, Ontario.

In the derailment of westbound passenger train No. 7 of the Canadian Pacific at the bridge over Spanish river, near Webbwood, Ont., 48 miles west of Sudbury, on January 21, about 1 p.m., 40 or more passengers were killed and 32 passengers and three or more trainmen were injured. A part of the train was derailed just at or before its entrance on a steel bridge over the river, and one passenger car fell through and was completely submerged in the river; the dining car was two-thirds submerged. The second-class passenger car was broken in two, the forward portion remaining on the bridge, with the baggage car, express and mail cars and locomotive, and the rear portion falling to the river with the two passenger cars which were behind it. The cars which fell into the river broke through a thick coating of ice, making clean-cut holes the size of the bodies of the cars, and the day coach was completely submerged or so nearly so that every person in it was drowned. The dining car rested partly on the bank, and the conductor of the train, Thomas Reynolds, who was in this car, by heroic efforts saved eight of its occupants. This car sank slowly and Reynolds, by diving beneath the water and reaching a window, succeeded in rising to the surface of the river outside the car, where a hole in the ice enabled him to gain a solid footing. He had no tools, but succeeded in breaking open the roof of the car.

Passengers in the day coach were imprisoned by the ice so that even if they escaped from the car they were drowned outside of it. The half of the second-class car which remained on the bridge took fire, apparently from the stove used in the car by passengers for heating their food, and nearly all of the occupants of this part of the car were burned to death. The latest despatches say that the known dead number 37, but it is likely that some bodies are yet in the river, and the number burned to death is unknown. There were about 80 passengers on the train.

The cause of the wreck thus far has been stated only vaguely as probably a broken rail or a broken wheel. A mail clerk who was in the car next to the engine says that he felt by the motion of the train, before reaching the bridge,

that some car in the rear part was off the track, and he also felt the air-brakes applied before the final disaster. It would seem that the car which was first derailed, probably the second-class car, ran against the end post of the bridge and knocked it down. At the time of the disaster, or soon after, the weather was extremely cold, the temperature going down to about 20 deg. below zero, and visitors the next day found the wrecked cars frozen as solidly into the river as though apparently they had been there a month. The bodies of some of the dead were also frozen solidly into the ice. The number of persons taken to the hospitals at Sudbury and elsewhere was about 30.

Dinner to Virgil G. Bogue.

San Francisco celebrated the advent of the Western Pacific Railway by a complimentary dinner given to its resident executives on the evening of January 8. Two hundred and fifty of the prominent men of San Francisco were present, including the mayor and other city officials. The dinner was in the nature of a farewell to Virgil G. Bogue, retiring vice-president and chief engineer, and a welcome to Vice-Presidents Charles H. Schlacks, Charles M. Levey and T. M. Schumacher, Secretary W. J. Bruen, Resident Counsel Warren Olney, Jr., General Auditor J. F. Evans, Chief Engineer T. J. Wyche and Traffic Agent W. J. Shotwell. Letters were read from George J. Gould and President E. T. Jeffery. Speeches were made by James McNab, Mayor Taylor, Mr. Schlacks, Mr. Bogue, Henry T. Scott on behalf of Governor Gillett, of California; and Warren Olney, Jr.

High tribute was paid to Mr. Bogue as the chief resident official and engineer in charge of construction during the past four years. Mr. Bogue expressed his appreciation of the many friendships he had formed in California and in reviewing the great work of building the Western Pacific gave due credit to all those who had aided him. Mr. Schlacks assured the diners of the good will and co-operation of the Western Pacific. Mr. Gould in his telegram voiced the earnest endeavor of the company to make the new railway worthy of the support of the business interests of San Francisco. Mr. Jeffery gave assurance that, with the Denver & Rio Grande, the Western Pacific would be maintained as an independent artery of commerce to be open on equal terms to all, and that the policy of the company would be to place all connections on an equality and to welcome the support and co-operation of all for the mutual benefit of the state of California, the city of San Francisco and of the railway's interests.

Mr. Bogue will resume his practice as consulting engineer in connection with large railway undertakings and will make his headquarters in New York.

Uniform Demurrage Rules.

The Chicago Demurrage Bureau on January 19 adopted without change and by unanimous vote the code of uniform demurrage rules recommended by the National Association of Railway Commissioners, to be put into effect March 1.

The Missouri Valley Demurrage & Storage Bureau on January 10 adopted a resolution favoring the adoption of this code of rules, effective March 10, and submitted the matter to letter ballot of the roads belonging to the bureau.

The action of the southern and southeastern roads and of the demurrage bureaus to which these roads belong, at Atlanta, January 11, has already been noticed. All the roads represented at the meeting declared their purpose to adopt the rules except the Nashville, Chattanooga & St. Louis and the Norfolk & Western, which will adopt them with certain modifications. The Nashville, Chattanooga & St. Louis will adopt rule 2, class B, section 1, amended so as to provide that, except at Nashville, 48 hours' free time will be allowed on cars containing grain, grain products and hay when held for reconsigning instructions. Both of the roads named decided to add to rule 1, section B, the words "or such cars when so loaded and held for original billing instructions." The managers of the demurrage bureaus were instructed to call attention to the requirement in rule 1 making it obligatory to insert in the notice of freight arrivals sent to consignees the point of shipment, as this has not been heretofore a requirement. The bureau managers were instructed to communicate with the proper officers of their various lines with a view to having this information inserted in all billings and to request that the matter be brought before the Association of American Railway Accounting Officers. The managers were also appointed a committee to present the new rules to the various state commissions and to press their application on state as well as interstate business.

The Indiana Car Demurrage Bureau adopted the uniform rules on January 6.

Respect for the Red Flag.

Passengers by a local train running between Deal and Dover yesterday afternoon saw on the heights some of the followers of the East Kent Foxhounds who had met some six miles from the town. As the train rounded a bend of the line the driver came upon the whole of the pack in a deep cutting, with the master and huntsmen on foot, and the fox, which had just been killed, in the middle of the hounds. The huntsman took off his red coat and waved it, and the driver brought the train to a standstill. After some little delay the master secured the fox, and the hounds were taken past the train, which waited until the master could climb out of the cutting to rejoin his field. The train then proceeded, having afforded its passengers a full view of the finish.—*London Times.* And just to think that the sacred sport of fox-hunting —the noble sport of sporty nobles—should be subject to such possibilities of interruption! Would that our British cousins could have the benefit of one of our prairie heroines and her red petticoat.

Hankow-Szechuan Loan.

Settlement has finally been reached in the matter of the Hankow-Szechuan railway loan of $30,000,000, and it is expected allotment of the bonds will be announced in the near future. England, France, Germany and America are each to secure a one-quarter interest, or $7,500,000.

J. P. Morgan & Co., who are representing the American syndicate in the negotiations, have agreed to reimburse the old Macy-Hawley syndicate, who held the original concession from the Chinese government, for all actual outlays heretofore made in cash and give them a substantial participation interest in the new loan.

The promise of the Chinese government of a half participation in this loan, should foreign capital for the construction of this line be necessary, was secured in 1902 by A. W. Bash, representing a syndicate composed of Messrs. Macy, Barney, Hawley and others who were to float the bonds. It has been the claim of this syndicate which has held up the loan negotiations in recent months. When the negotiations for the present loan were being conducted by the English, French and German bankers, the American government suddenly remembered this American concession and through the state department at Washington turned the matter over to the firm of J. P. Morgan & Co., who put in a claim for American participation.

The Morgan firm in 1905 had conducted the negotiations with the Chinese government by which the contract with the old American-China Development Co. for the construction of the Hankow-Canton line had been canceled and such work as had been done on the line, which consisted of 32 miles of railway and about 50 miles of earthwork, was taken over by the Chinese government on payment of $6,750,000 gold, $3,000,000 of which was claimed to have been expended in cash and a further sum of $3,750,000 was claimed as compensation for the loss of valuable rights. Chinese officials have assumed a friendly attitude toward the Macy-Hawley syndicate and have placed every obstacle in the way of the new negotiations until assured that its claims would be taken care of by the new Morgan syndicate.

The Hu-Nan gentry, representing the landed owners, were the ones who felt the burden of raising the money which represented the profits of $3,750,000, which went to the former syndicate, headed by Morgan & Co., who had the concession for the line between Canton and Hankow. These gentry threatened a rebellion if the present loan was executed with-

out their revision and if the claims of the Macy-Hawley syndicate were not recognized.

Since the concession for the Hankow-Canton railway was canceled and the Chinese government compelled to pay $6,750,000 gold for 32 miles of railway and some 50 miles of earthwork, the gentry have been much opposed to Morgan participation in any other concession in their territory. For this reason it has been a difficult matter to complete the present negotiations.

The new line, for which the $30,000,000 loan is now arranged will run from Hankow to I-Chang, thence to Chung-King and Chung-Tu in the province of Szechuan. The railway which had been planned to extend southward from Hankow to Canton has been given up for the present and the new line will extend to the westward instead, into one of the most thickly populated provinces of China. It is estimated that the province of Szechuan contains a population of seventy million.—*Wall Street Journal.*

Railway Matters in Washington.

Washington, Jan. 26.

A Senate resolution, passed two years ago, calling for the investigation of alleged violations of the conditions of the land grant to the California & Oregon Railroad, has been again brought up, Senator Chamberlain of Oregon offering a resolution, which the Senate has passed, calling upon the attorney-General for information as to why the government has not carried out the instructions of the earlier resolution. The basis of this inquiry was a charge that the railway company held two million acres unlawfully, refusing to sell land to settlers at the prices named in the grant.

At the conference of state governors held here last week Governor Eberhart of Minnesota offered a resolution which he proposed to have sent to Congress looking to a change in the federal statutes which would forbid taking railway cases concerning intrastate questions to the federal courts until the authority of the state courts should have been exhausted.

Men from Chicago, who have been here during the past week, say that they are going to renew the agitation for publicity of railway receipts and expenses in detail, to counteract what they say is a determination, already become general among the railways, to advance by 5 per cent. or more the rates on freight from Chicago in all directions.

Alleged Frauds in Purchases of Real Estate for Chicago & Western Indiana.

The board of directors of the Chicago & Western Indiana filed a petition in the Cook county circuit court at Chicago on January 19 asking that Benjamin Thomas, former president of this road; Charles R. Kappes, formerly its real estate agent, and John C. Fetzer, a real estate dealer, be required to make an accounting of unlawful profits which it is alleged they have derived from purchases of real estate made on behalf of this road. At the same time the state's attorney of Cook county, John E. Wayman, began an investigation to determine whether the three men mentioned should be indicted for the frauds which it is alleged that they have committed.

Mr. Thomas was president of the Chicago & Western Indiana until June, 1908, when his resignation was asked for and received by the board of directors. Mr. Kappes at the same time was discharged from the service of the company.

According to the petition filed in the circuit court the unlawful profits of the three men mentioned from the real estate deals referred to amounted to about $850,000. The transactions involved a total of about $3,000,000. Purchases of real estate for team tracks in South Chicago, at Rockwell street, at West Twelfth street and at Twenty-third street was authorized about four years ago, and were made in 1906 and 1907. It is charged that after the purchases were authorized Kappes proposed to Fetzer that the latter should buy the various pieces of property needed and turn them over to the company. Whenever the board of directors decided to buy a particular piece of property "Thomas and Kappes," says the petition, "being enabled to do so because of their official relations, procured the employment of Fetzer to make such purchases and that they caused the moneys and bonds of the company to be placed in the hands of Fetzer to be used in making such purchases and that Fetzer purchased the real estate with the money or bonds and fraudulently reported to the company that he had expended a sum greatly in excess of the amount actually expended by him therefor, and that Thomas and Kappes, taking advantage of their relations with the company, caused the Fetzer account on the books of the company to be credited with the amounts in this manner falsely reported by him. The difference between the amounts actually expended by Fetzer and the amounts so reported by Fetzer to have been expended were divided between the said Thomas, Kappes and Fetzer and certain other persons who are to your orator unnamed."

The bill of the complainant is very voluminous, containing almost 60 typewritten pages, and it sets forth in detail each transaction which is alleged to have been made and the profits which are said to have been secured and divided. In all cases, according to the allegations, the profits derived by the defendants were very large, and in some cases the property was turned into the company at twice as much as had been paid for it to its true owners. It is alleged that in order to prevent detection of the fraudulent nature of the transactions, the property in many cases was transferred from its true owners to "dummies" representing Fetzer and then retransferred from these dummies to the company. It would appear from the allegations that in many cases the dummies in question did not know that their names were being used.

It is alleged that when Thomas and Kappes were removed they destroyed or removed from the offices of the company large quantities of books and papers, among them being those relating to the transactions with Fetzer. On account of the removal or destruction of these papers complainant states that it is unable to say with great particularity just what reports were made by Fetzer in reference to the purchase of some of the property. The petition says that as a result of the orator's investigation "it is believed and therefore charged that the difference between the amount of your orator's said moneys and bonds turned over to the said Fetzer and the actual amounts actually paid out therefor by the said Fetzer to the true sellers of the real estate was not less than $850,000. Your orator believes and charges that this sum was, in fraud of your orator, divided between the said Fetzer, Thomas and Kappes and certain other persons whose names are unknown, and now is due and owing to your orator from them."

It was suspected that Thomas, Fetzer and Kappes kept some of their alleged profits in the form of bonds of the company, and Judge Windes, of the circuit court, therefore issued an injunction restraining every known safety deposit company in Chicago from permitting any of the defendants or their wives or other persons from taking out of any box or boxes which they may have rented any securities or papers.

On January 21 a civil suit was brought against Thomas, Fetzer and Kappes, which also involves Henry Hafer, a Chicago coal dealer. The bill in this case alleges that in 1907 Fetzer bought with money belonging to the railway several lots from T. C. Keller, paying him $200,000, and assuming incumbrances of $120,000, making a total of $320,000. Later the incumbrance was liquidated with 120 Western Indiana bonds. At about the same time, it is alleged, Fetzer bought from Mr. Hafer with the railway's money some lots, paying for them $75,000 in cash and assuming an incumbrance amounting to $205,000. This incumbrance also was soon liquidated with 205 of the railway's bonds. According to the allegations of the bill, Fetzer later represented that the lots previously bought from Keller were not needed at that time and had been given to Hafer as additional consideration for the property purchased from him. It is stated in the bill that Fetzer actually had Keller transfer these lots to Edward H. Peters, Fetzer's partner, that Peters conveyed them to Joseph P. Fleming and that Fleming conveyed them to Fetzer. It is alleged that in 1909 the directors of the Western Indiana decided that they needed these lots, that Fetzer was instructed to get them, that on March 12 he filed a deed dated 1907 conveying them to Henry Hafer, and then almost immediately bought them back from Hafer for $460,000 supplied by the railway. The bill filed by the railway says that the proceeds of this last sale were divided between Fetzer, Hafer, Thomas and Kappes,

and asks the court to order this $460,000 to be returned to the railway on the ground that the railway had already paid $320,000 for the lots in 1907.

William J. Henley, who was vice-president and general counsel of the Chicago & Western Indiana while Mr. Thomas was president, was elected president to succeed him. Immediately following the bringing of the civil action Mr. Henley resigned, and E. B. Pryor, vice-president of the Wabash, was elected president of the Chicago & Western Indiana, and George G. Yeomans, assistant to the president of the Wabash, was elected vice-president. It is officially stated that Messrs. Pryor and Yeomans were elected merely to operate the property temporarily.

It appears that the directors of the Chicago & Western Indiana have suspected for a long time that all was not just as it should be in relation to these real estate transactions and that they have been quietly making a thorough investigation for a long period. Following Mr. Thomas' enforced resignation as president of the Chicago & Western Indiana he was elected chairman of the General Managers' Association of Chicago. His election was resisted by officers of some of the roads which owned the Chicago & Western Indiana, and as a result of it the Grand Trunk, the Wabash, the Erie and the Chicago Great Western withdrew from the General Managers' Association. The fact that they had withdrawn did not become public until the filing of the suits referred to. Besides the roads just mentioned, the Chicago, Indianapolis & Louisville and the Chicago & Eastern Illinois were stockholders in the Chicago & Western Indiana, each of the five owning $1,000,000 of its capital stock. The Chicago, Indianapolis & Louisville and the Chicago & Eastern Illinois did not withdraw from the General Managers' Association, nor did the Atchison, Topeka & Santa Fe, which is one of the lessees of the property.

The Illinois Central is also affected by the real estate deals in question to the extent of about $100,000. The Western Indiana and the Kensington & Eastern, the latter of which is owned by the Illinois Central, occupy the same right of way near Hegewisch, Ill., and it is stated that the Western Indiana acquired this property and the Illinois Central paid for half of it.

The accused men have given interviews to the newspapers making general denials of the allegations against them.

On January 24 W. L. Reed, general attorney of the Chicago & Western Indiana, was relieved from duty until February 1, it being stated that the management desired meantime to make an investigation of his office.

Mr. Thomas on January 24 sent his resignation as chairman of the General Managers' Association to J. W. Kendrick, chairman of the executive committee of the association. In his letter of resignation Mr. Thomas branded the various charges against him as "wickedly false, unjust and untrue." Henry Hafer issued a statement admitting that he had sold some lots to the Western Indiana, but absolutely denying that he was a party to any frauds on the company or that he had any knowledge of any frauds that had been committed.

Albemarle Sound Bridge.

On Sunday last the Norfolk & Southern began running regular trains across its Albemarle Sound bridge, 29,000 ft. long. This bridge spans the beautiful and placid Albemarle Sound, between Edenton, N. C., and Mackey's Ferry. Hitherto passenger and freight cars have been transferred between Edenton and Mackey's Ferry by the steamer "John W. Garrett," which now gives place to the longest continuous bridge across navigable waters in the world. Passenger trains cross the bridge in 28 minutes, a saving of one hour and thirty-two minutes over the old time, and on freight there is a saving of eight hours and twenty minutes. Four million feet of lumber, 1,000 carloads of cypress piles, 250 carloads of steel and a trainload of spikes and bolts were used in the construction of this overwater railway. The piles are all 70 ft. or more in length—the longest being 95 ft. These piles are driven at a slight angle into the bed of the sound 40 to 65 ft., and braced and bound firmly at the top. At high tide the deck of the bridge is 13 ft. 2 in. above the water. There are two large draws and five smaller gas-boat spans in the bridge. At the Scherzer roller lift draw there is 140 ft. open space, and at the swing draw there is a clearance of 35 ft. The completion of this bridge places Norfolk, Virginia, and Suffolk, Virginia, and all North Carolina in the closest relationship.

The Name of the Overland Limited.

An officer of the Chicago & North Western writes as follows concerning the change in name of the "Overland Limited:" "In the general news section of the *Railway Age Gazette*, January 14, 1910, we note a statement that the name of 'The Overland Limited' has been changed to the 'San Francisco Limited.' So far as the 'Overland Limited' on the Chicago & North Western is concerned, we retain that name which has been made famous the world over by continual advertising for many years. The only change that has been made, so far as the through electric lighted train which runs over the Chicago & North Western, the Union Pacific and the Southern Pacific is concerned, is that we add the name 'San Francisco' and the train is now called *The San Francisco Overland Limited*, and is so advertised the world over."

International Master Boilermakers' Association.

The annual convention of the International Master Boilermakers' Association will be held at the new Clifton hotel, Niagara Falls, Ont., May 24-27, 1910.

Central & Western Association of Car Service Officers.

The next meeting of the Central & Western Association will be held at the Palmer House, Chicago, February 17, at 10 o'clock sharp. In order to enable the secretary to prepare a suitable programme, members will kindly forward to him any suggestions as early as possible.

Reading Veterans.

The annual meeting of the Veteran Employees' Association of the Philadelphia & Reading Railway was held at Harrisburg, Saturday, January 22, with about 600 members present, including Messrs. Baer, Voorhees, Dice, Paisley and other officers. The president of the association for the ensuing year is William B. Conrad.

American Institute of Electrical Engineers.

The meeting, specially arranged for the South Atlantic states, will be held at the Selwyn hotel, Charlotte, N. C., March 30-April 1, 1910. This Charlotte meeting will not take the place of the Institute's annual convention, which will be held as usual later in the year at a place not yet decided upon.

Wood Preservers' Association.

The Wood Preservers' Association closed its annual meeting with a banquet at the Chicago Athletic Club, in Chicago, on Thursday evening, January 20. Summaries of the papers read at the meeting were given in last week's issue of the *Railway Age Gazette*, page 152. At the closing business session it was decided to hold next year's meeting in Chicago, and the following officers were elected for the next year: President, Walter Beuhler (re-elected), St. Louis, Mo.; first vice-president, C. W. Berry, Laramie, Wyo.; second vice-president, David Allerton, Madison, Ill.; third vice-president, C. D. Chanute, Chicago, Ill.; secretary and treasurer, F. J. Angier, Galesburg, Ill.

In addition to the regular program, H. F. Weiss, of the United States Forest Service, spoke briefly on the problems of wood preservation that the Forest Service proposes to investigate at the new forest products laboratory at Madison, Wis. He read a list of 39 problems that have been suggested by railways, timber treating companies and others interested in this work, and requested the members of the association to discuss and suggest additions to the list. The following subjects of investigation are of particular interest to railway officers: The determination of the amount of oil to be injected in various species of ties to secure a deterioration from

decay that will exactly equal the mechanical abrasion; the determination of a satisfactory method of treating wood for refrigerator cars and stave factories; the determination of the resistance of treated timber to the passage of electric curent, and the determination of the durability of treated timber when surrounded by concrete.

American Railway Engineering and Maintenance of Way Association.

A meeting of the board of direction of the American Railway Engineering and Maintenance of Way Association was held in New York January 18, and the following were nominated for officers for the current year: President, L. C. Fritch, chief engineer, Chicago Great Western; vice-president, Chas. S. Churchill, chief engineer, Norfolk & Western; secretary, E. H. Fritch; treasurer, Chas. F. Loweth, engineer and superintendent bridges and buildings, Chicago, Milwaukee & St. Paul. The directors to serve three years each are: F. S. Stevens, superintendent, Philadelphia & Reading; Robert Trimble, chief engineer maintenance of way, Northwest System, Pennsylvania Lines West.

The nominations for members of the committee of arrangements are: W. A. Wallace, chairman; Frank R. Coates, T. L. Condron, J. B. Cox, L. C. Fritch, John C. Sesser and O. J. West.

International Railway Fuel Association.

The second annual meeting of the International Railway Fuel Association will be held at Hotel La Salle, Chicago, May 23-26, 1910. The papers to be read at the meetings and the committees in charge are as follows:

Papers 1 and 5 consolidated.—"Grade of fuel most suitable for locomotive use, considering cost per unit of traffic and best interests of producer." "Recommended methods of preparing coal as to size for locomotives." J. G. Crawford, chairman, fuel engineer, C., B. & Q., Chicago; Le Grand Parish, S.M.P., L. S. & M. S., Cleveland, Ohio; Curtis Scovill, A.G.S.A., Central Coal & Coke Co., Dallas, Tex.

Paper No. 2.—"Standard uniform blank for reporting all items of cost in connection with fueling stations and handling fuel, for all types of stations and conditions." R. Emerson, chairman, Asst. to Genl. Mgr., Lehigh Valley, South Bethlehem, Pa.; F. V. Hetzel, chief engineer, Link Belt Co., Nicetown, Pa.; A. E. Averill, editor, *American Engineer & Railroad Journal*, New York; N. M. Rice, G.S.K., A., T. & S. F., Topeka, Kan.

Paper No. 3.—"Accounting for fuel consumed. Individual records of performance." W. E. Symons, chairman, C. & G. W., Chicago; E. A. Foos, C. C. Fuel, Rail & Tie Dept., C. B. & Q., Chicago; E. J. Roth, Jr., fuel inspector, B. & O., Baltimore, Md.

Paper No. 4.—"Methods of purchasing fuel with regard both to traffic conditions and to producers' interests. Relation between producer and railway." W. H. Huff, chairman, V.P., Victor-American Fuel Co., Denver, Colo.; L. L. Chipman, G.S.M., Fidelity Coal Mining Co., Kansas City, Mo.; W. K. Kilgore, fuel agent, C., M. & St. P., Chicago.

Paper No. 6.—"Methods of supervision, instruction and encouragement in locomotive operation to secure greatest efficiency in fuel consumption." D. Meadows, chairman, Asst. Div. M.M., Michigan Central, St. Thomas, Ont.; W. C. Hayes, Supt. locomotive operation, Erie, New York; J. McManamy, R. F. of E., Pere Marquette, Grand Rapids, Mich.

Special paper "A."—"Character of membership that should be encouraged in the association and steps to secure that membership." S. L. Yerkes, fuel agent, Queen & Crescent, Lexington, Ky.

Special paper "B."—"Methods of kindling locomotive fires." C. F. Richardson, Asst. to G.S.M.P., C., R. I. & P., Chicago.

Omaha Railway Club.

The following officers have been elected by the Omaha Railway Club for the ensuing year: Chairman of the board of directors, H. C. Piculell, commercial freight agent, Baltimore & Ohio; president, Wm. L. Park, general superintendent Union Pacific; first vice-president, Everett Buckingham, general manager Union Stock Yards; second vice-president, W. A. Dilworth, general attorney Chicago, Burlington & Quincy; secretary, A. H. Christiansen, soliciting freight agent Northwestern Line. Chairmen of the standing committees: House, D. B. Allan, Union Pacific; entertainment, R. E. Hayward, C., B. & Q.; auditing, F. Montmorency, C., B. & Q. The club has about 300 members in good standing but as about 500 are needed in order to place it on a sound basis the directors have considerable work in sight, and, therefore, will hold weekly meetings during the next two or three months. The club was originally organized by railway men, but, following the course pursued by the New York Railroad Club and similar organizations, it has decided to admit persons who are connected with business enterprises closely allied with the railways.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; May 10-13; Indianapolis.
AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.; June, 1910; Niagara Falls, Ont
AMERICAN ASSOC. OF LOCAL FREIGHT AGENTS' ASS'NS.—G. W. Dennison, Penna. Co., Toledo, Ohio
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th St., N. Y.; 2d Friday in month; New York; March 30-April 1; Charlotte, N. C.
AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York; May 18; New York.
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—S. F. Patterson, B. & M., Concord, N. H.
AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASSOC.—E. H. Fritch, Monadnock Bldg., Chicago, March 14-17, 1910; Chicago.
AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis; second Tuesday, May; Memphis, Tenn.
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Building, Chicago; June 20-22; Atlantic City.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. Edgar Marburg, Univ. of Pa., Philadelphia.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., N. Y.; 1st and 3d Wed., except July and August; New York.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., N. Y.; 2d Tues. in month; New York.
AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 W. 39th St., New York.
ASSOCIATION OF AM. RY. ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; June 29, 1910; Colorado Springs.
ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A., T. & S. F., Topeka, Kan.; May; Nashville, Tenn.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wisconsin Central Ry., Chicago; May 16-20, 1910; Los Angeles.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Place, N. Y.
BUFFALO TRANSPORTATION CLUB.—J. N. Sells, Buffalo.
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, Montreal, Que.; irregular, usually weekly; Montreal.
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R. R., Richmond, Va.; June 15, 1910; California.
INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., N. Y.; May 24-27; Niagara Falls, Ont.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago; May 23-26; Chicago.
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.; May; Cincinnati.
IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August; Des Moines.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago; June 15-17; Atlantic City.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.
NORTH-WEST RAILWAY CLUB.—T. W. Flanagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, August; St. Paul and Minn.
NORTHERN RAILWAY CLUB.—Fourth Saturday in month; Duluth, Minn.
RAILROAD CLUB OF KANSAS CITY.—Third Friday in month; Kansas City.
RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C., Collinwood, Ohio; May 16-18; St. Louis.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Norquist, Chicago.
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. H. O'Donnell, Bogalusa, La.
SOUTHERN AND SOUTHWESTERN RY. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., April, Aug. and Nov.; Atlanta.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R. R., East Buffalo, N. Y.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, 199 Chestnut St., Winnipeg; 2d Monday, except June, July and August; Winnipeg
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago; 1st Wednesday, except July and August; Chicago.
TRAFFIC CLUB OF NEW YORK.—C. A. Swope

Traffic News.

Commissioner Clark resumed at Chicago on January 25 the hearings which the Interstate Commerce Commission is conducting on the subject of billing in transit. The purpose of the investigation is to determine whether, by a manipulation of billings, shippers of grain and other commodities are enabled in effect to cut the rates.

The Grand Trunk has notified its competitors and connections in the middle West that for the meeting of the National Educational Association in Boston, next summer, it will make a rate of one fare for the round trip, or about 25 per cent. less than has been made for similar meetings in the past. It is said that the roads west of Chicago are offering a similar reduction to induce the association to hold its meeting on the Pacific coast.

Switching rates in Superior, Wis., are now on the same basis as those in Duluth; to points within the city limits, excepting Allouez and Itasca, 15 cents a ton instead of 25 cents; to Allouez, Itasca and Pokegama Junction reduced from 30 cents to 25 cents; and the carload maximum will be 40,000 lbs., instead of 60,000. The demand for lower switching rates was made by the Superior Commercial Club, and the railways, rather than let the matter go before the state railway commission, agreed to grant the demand.

This week the Pennsylvania Railroad ran a farmers' instruction train over the Pope's Creek branch of the Philadelphia, Baltimore & Washington. Co-operating with the company will be the Farmers' Institute of Maryland, with the director, William Lee Ames, in charge. The Pennsylvania began its good-farming campaign two years ago, and since that time has run instruction trains and steamboats giving "good roads" lectures, and distributed farm literature. In addition, the company has recently established an experimental farm on the Delaware peninsula.

The Erie and the Delaware, Lackawanna & Western have announced that on April 1 they will reduce westbound freight rates to the basis of 69 cents first-class New York to Chicago. The present rates are on the basis of 75 cents. This action follows a reported failure of negotiations which have been going on for some time past, which it was hoped would lead to an advance of the rates by the differential lines. If the change is carried out and if the differential lines make no change, the difference between the Erie on the one hand and the Lackawanna and the differential lines on the other will be reduced from 10 cents, first-class, to four cents.

The last silk train to arrive at New York came through from Seattle in four days 22 hours, and the goods were ready to unload 14 hours before the arrival of the mail from the same Japanese steamer; and as the bills of lading, on which the goods were to be delivered, were in this mail, the extra fast time was of no benefit except as an advertisement of the very fine performances of the locomotives. These shipments, which filled five cars, came over the Chicago, Milwaukee & St. Paul; but the press agent of the road or roads east of Chicago must have been napping, as the reporters seem to be oblivious to the fact that the St. Paul road ends at Chicago.

The Pennsylvania Railroad is distributing thousands of copies of the pamphlet just issued by the Department of Commerce and Labor, entitled "Packing for Export." The Pennsylvania estimates that in 1908 it paid out $185,000 in damage claims, which arose from poor and insecure packing. The present pamphlet describes in detail the so-called packing evils and is profusely illustrated with photographs of typical samples of poor packing. The annual freight loss and damage in the United States is estimated at $20,000,000. The loss in the foreign trade is not included in the twenty million, but aggregates a large sum. Reports from consuls show not only loss in the articles shipped, but a loss of trade because of carelessness in packing. Out of 1,000 bags of cottonseed meal shipped to a European port, 800 were badly torn and damaged because of inadequate wrapping. Machinery is frequently received at foreign ports in a ruined condition because sent in thin pine boxes instead of being knocked down and properly guarded. There is great loss in cotton bales because of inadequate covering, although cotton shipped from Egypt rarely sustains any loss. The Pennsylvania has recently been educating shippers by taking parties of them to freight stations to see the poor condition in which many packages of freight are received. This campaign of education is to be extended to cover the entire railway.

Western Classification Committee.

The Western Classification Committee adjourned its meeting at San Antonio, Tex., on January 21. It decided to hold its next meeting at Glenwood Springs, Colo. It considered and disposed of a large number of questions.

One of the most important is that of ratings on returned shipments. The provision in the Western Classification has been that returned shipments would be transported for one-half of the rate for the original shipment. An administrative ruling of the Interstate Commerce Commission being unfavorable to this practice, the committee decided to make the rates on returned shipments the same as on original shipments, except in the case of empty carriers.

A full line of rates for aluminum and all articles manufactured from it was provided. Only a few rates have been fixed for aluminum and its products heretofore, articles not otherwise specified being charged first class.

A large representation of shippers appeared before the committee to ask that allowance be made in future for actual dunnage instead of as at present for 500 lbs. of dunnage per car. It was argued that in many cases where articles are shipped on flat cars the dunnage actually amounts to from 1,000 to 1,500 lbs., and it was contended that this should be considered merely a part of the car rather than a part of the shipment. The committee decided, however, to retain the present rule.

Wooden box manufacturers appeared to ask that wooden cases be made standard. It was understood that they would ask that a penalty be fixed for goods not shipped in wooden cases. The manufacturers of wooden boxes, however, withdrew their proposition with the understanding that it would be presented again at the next meeting of the committee.

Manufacturers of agricultural implements asked that provision be made for an increase in the number of mixed carloads, especially in the case of hand instruments, but their application was rejected.

A proposition to eliminate ratings on bulk bottles and to require that in future all bottles shipped should be crated was rejected. The rule of the Official Classification regarding the loading of bottles was adopted.

A proposition, the adpotion of which would have permitted the mixing of all kinds of canned goods in carloads, was favored by the representatives of large eastern jobbing houses and opposed by the representatives of western jobbing concerns. The Committee decided to reject the application.

A material change was made in the classification of candy. Candy makers contended that putting all candy worth more than 10 cents in first class and all valued at less than 10 cents as third class is unreasonable. The Committee decided to make candy third class when invoiced at 15 cents a pound or less, and first class when invoiced at more than 15 cents.

The classification of brass and iron beds was changed from fifth class (carload minimum, 30,000 lbs.) to fourth class (carload minimum, 40,000 lbs.) subject to rule No. 6 B.

The Committee made new ratings on church glass. It provided that cathedral glass, when it does not exceed 20 united feet, shall be 1½ times first class, and, when exceeding 20 united feet, double first class. Pane glass or glass that is colored or of straight line or angle pattern is made second class when its united measurement is under 20 ft. and first class when over 20 ft.

Roasted coffee when packed in burlap bags lined with waterproof paper was reduced from third to fourth class. It was proposed to require all shipments of rugs to be boxed, but the protest received against this was so strong that action was deferred until the next meeting.

It was proposed to provide in the Classification that the railways should notify the consignor of a consignee's refusal

or failure to accept a consignment. It has been customary for railways to give such notification. Objection was made to making it obligatory, however, and the proposed change was rejected.

Revenues and Expenses of Railways.

Summary of monthly reports of revenues and expenses of railways in the United States filed with the Interstate Commerce Commission, Bureau of Statistics and Accounts, before November 30, 1909, is as follows:

	SEPTEMBER.					
	1908			1909		
Item.	Amount.	Per Mile of line.	Ratio p. ct.	Amount.	Per Mile of line.	Ratio p. ct.
Rail operations:						
Freight revenue	$149,351,718	$645	68	$167,670,796	$710	68
Passenger revenue	53,683,528	232	25	60,674,687	257	25
Other transp. rev.	14,049,265	61	6	15,573,388	66	6
Nontransp. rev.	1,929,192	8	1	2,147,085	9	1
Total oper. revs.	$219,013,703	$946	100	$246,065,956	1,043	100
Maint. way & struc	$28,720,258	$124	13	$33,486,237	$142	14
Maint. equipment	31,691,646	137	14	34,315,106	145	14
Traffic expenses	3,957,381	17	2	4,575,761	19	2
Transp. expenses	67,738,498	293	31	72,884,895	309	30
General expenses	5,043,207	22	2	5,357,965	23	2
Unclassified exp.	4,154	..	..	2,036	..	..
Total oper, exp.	$137,155,143	$593	63	$150,622,000	$638	61
Net oper. rev.	$81,858,560	$354	37	$95,443,956	$404	39
Outside operations:						
Total revenues	$4,195,125	$18	..	$5,180,042	$22	..
Total expenses	3,625,543	16	..	4,626,900	20	..
Net revenue	$569,582	$2	..	$553,142	$2	..
Total net rev.	$82,428,142	$356	..	$95,997,098	$407	..
Taxes (1/12 an'l amt.)	7,439,414	32	..	7,994,148	34	..
Operating income	$74,988,728	$324	..	$88,002,950	$373	..
Number reports	856	..	..	882	..	..
Mileage operated	231,411	..	..	236,033	..	..

NOTE.—The amounts for September, 1908, here given, represent the 1908 returns as restated by the carriers on the 1909 reports, to provide a true basis for comparison. Changes and corrections made subsequent to the filing of the original September, 1908, reports during the succeeding twelve months may affect the totals and averages somewhat, and additional slight differences may arise from the necessary omission of a number of reports which are not yet available for tabulation.

Freight Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, presenting statistical bulletin No. 60, covering car balance and performance for July, 1909, says:

"The per cent. of unproductive cars was lower than in June, the decrease in surplus being more than sufficient to offset the increase in shop cars. The adjusted performance is as follows:

	Average miles per day.		Average ton-miles per car per day.		Average earnings per car per day.	
	Inc. surp. cars.	Exc. surp. cars.	Inc. surp. cars.	Exc. surp. cars.	Inc. surp. cars.	Exc. surp. cars.
December, 1907.	21.9	23.9	289	316	$1.98	$2.17
January, 1908.	20.8	24.9	277	325	1.81	2.17
February, 1908.	19.7	23.8	271	328	1.82	2.20
March, 1908.	21.2	25.5	290	348	1.95	2.34
April, 1908.	19.6	24.5	258	324	1.83	2.29
May, 1908.	19.3	24.8	254	329	1.72	2.22
June, 1908	19.6	24.7	276	347	1.88	2.37
July, 1908.	20.0	24.8	275	342	1.84	2.26
August, 1908.	20.8	25.1	292	354	1.98	2.40
September, 1908	22.0	25.2	320	367	2.24	2.57
October, 1908.	23.8	25.9	346	376	2.33	2.54
November, 1908	23.5	25.8	341	375	2.32	2.55
December, 1908	22.3	25.2	332	376	2.16	2.45
January, 1909.	20.9	25.3	293	354	1.98	2.39
February, 1909	21.7	25.9	306	365	2.04	2.43
March, 1909	22.7	27.2	330	393	2.19	2.61
April, 1909.	22.4	26.8	310	371	2.13	2.54
May, 1909.	22.5	26.8	304	362	2.05	2.45
June, 1909.	22.4	26.5	314	371	2.13	2.52
July, 1909	22.0	25.8	309	362	2.09	2.45

"The average miles per day for active cars, although somewhat lower than during the months immediately preceding, is one mile per day higher than the average for July, 1908. The daily ton-miles per car and the average earnings also show a fair advance over the previous year's figures. The cars at home decreased slightly, falling from 75 per cent. in June to 74 per cent. in July, with an increase in the loaded mileage from 67.8 per cent. to 68.3 per cent. The shop cars increased from 7.73 per cent. to 7.91 per cent., while the average tons per loaded car remained at 20.7."

The accompanying table gives car balance and performance in July.

FREIGHT CAR BALANCE AND PERFORMANCE IN JULY, 1909.

	New England.	New York, New Jersey, Del., Md., Eastern Pa.	Ohio, Indiana, Mich., Western Pa.	Virginia, W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minnesota.	Montana, Wyo., Neb., Dakotas.	Kansas, Colo., Oklahoma, Mo., Ark.	Texas, Louisiana, N. Mex.	Oregon, Idaho, Nev., Cal., Arizona.	Canadian Lines.	Grand total.
Revenue freight cars owned	75,307	666,139	251,613	131,789	174,934	374,963	16,882	130,792	27,007	110,619	99,159	2,059,204
Average number of system cars on line	55,321	476,041	197,241	93,986	130,798	305,025	7,642	98,176	16,836	67,083	83,104	1,531,253
Railroad-owned cars: Av. foreign on line	25,988	168,497	60,774	23,272	30,285	81,702	11,775	33,454	16,219	41,848	15,257	509,071
Total cars on line	81,309	644,358	258,235	117,258	161,083	386,727	19,417	131,630	33,055	108,931	98,361	2,040,544
Excess	6,002	.....	6,622	.....	.....	11,764	2,523	838	6,048	.....	.....	.....
Per cent. cars on line to total owned:												74
Home	73	72	79	71	75	81	45	75	62	60	84	25
Foreign	35	25	24	18	17	22	70	26	60	38	15	99
All railroads	108	97	103	89	92	103	115	101	122	98	99	94,971
Private cars on line	3,355	38,121	9,101	2,653	6,272	14,213	1,400	7,774	1,741	7,212	3,159	
Total, all cars on line	84,664	682,659	267,336	119,911	167,355	400,940	20,817	139,374	34,796	116,143	101,520	2,135,515
Per cent. of cars in shop	6.73	7.57	7.33	8.37	8.74	6.47	4.56	14.79	6.19	6.48	12.37	7.91
No. of freight engines owned	1,113	9,995	3,584	2,225	2,555	6,239	459	2,507	754	2,226	2,110	33,767
Av. cars on line per freight engine owned	76	68	75	54	66	64	45	56	46	52	48	63
Total freight-car mileage	42,639,048	469,409,759	168,733,113	78,947,155	108,378,303	274,462,844	24,652,710	83,740,628	26,262,265	99,747,987	72,522,026	1,449,529,605
Average miles per car per day	16.2	22.2	20.4	21.2	20.9	22.2	38.2	20.3	24.3	27.7	23.0	22.0
Per cent. loaded mileage	70.9	65.6	65.7	67.5	68.8	71.2	74.1	70.1	66.8	70.0	74.1	68.3
Ton-miles of freight, Inc. Co. freight	434,330,752	7,022,370,869	2,532,371,675	1,083,638,757	1,409,837,124	2,190,754,384	355,733,703	1,125,264,486	269,811,529	1,429,385,626	871,089,687	18,724,588,592
Average ton-miles, Including Co. freight:												14.1
Per car-mile	10.3	15.0	16.1	13.7	13.1	12.8	14.9	13.4	11.5	14.3	12.0	20.7
Per loaded car-mile	14.5	22.8	24.5	20.3	17.9	18.2	20.1	19.2	17.5	20.5	16.2	309
Per car per day	167	332	340	292	276	276	600	263	269	397	277	
Gross freight earnings	$5,130,638	$42,692,276	$14,327,152	$7,035,323	$9,413,117	$19,394,325	$3,093,183	$9,537,479	$2,863,926	$12,565,176	$6,360,922	$132,413,517
Average daily earnings: Per car owned	$2.20	$2.07	$1.84	$1.72	$1.75	$2.14	$5.91	$2.35	$3.42	$3.67	$2.07	$2.16
Per railroad-owned car on line	2.04	2.14	1.79	1.94	1.90	2.09	5.14	2.34	2.79	3.72	2.09	2.19
All cars on line	1.97	2.02	1.73	1.89	1.83	2.00	4.79	2.21	2.66	3.49	2.02	2.09

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF NOVEMBER, 1909.
(See also issues of January 7, 14, and 21.)

Name of road.	Mileage operated at end of period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenues (or deficit).	Outside operations. net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
Alabama & Vicksburg	143	$98,614	$46,128	$155,264	$20,123	$19,229	$3,652	$43,332	$5,080	$91,416	$63,848	.....	$4,250	$59,598	$19,363
Ann Arbor	301	106,960	39,515	157,907	26,560	20,831	3,642	48,504	4,244	103,781	54,126	— $1,995	12,330	39,801	267
Atlantic & St. Lawrence	167	110,250	23,024	141,864	33,472	15,126	3,121	43,177	2,856	97,752	44,112	.....	6,436	37,676	55,565
Charleston & Western Carolina	340	108,653	29,947	145,485	33,239	16,579	3,347	39,794	3,768	96,727	48,758	.....	4,475	44,283	25,517
Chicago, Cincinnati & Louisville	285	109,210	22,015	141,743	26,511	21,407	8,403	58,639	5,775	120,735	21,008	.....	3,405	17,603	29,772
Chicago, Peoria & St. Louis	255	134,746	24,922	166,576	25,744	27,997	6,535	60,859	5,541	126,676	39,900	.....	4,150	35,750	27,000
Cincinnati Northern	248	85,979	15,366	106,336	12,332	21,012	2,870	48,956	2,905	88,075	18,261	.....	4,100	14,161	26,086
Cleveland Terminal & Valley	93	80,638	15,714	125,685	13,098	12,302	1,399	43,517	1,698	72,014	53,671	.....	3,403	50,268	30,632
Detroit, Grand Haven & Milwaukee	190	113,414	41,666	182,774	21,726	23,924	4,899	66,785	3,234	120,568	62,206	—23	2,727	59,456	45,790
Detroit, Toledo & Ironton	441	119,999	12,874	143,142	32,285	29,632	2,939	65,712	3,966	134,534	8,608	.....	6,510	2,098	—7,393
Grand Trunk Western	336	341,653	135,974	512,104	55,059	75,681	17,855	198,179	16,573	363,347	148,757	—1,966	29,190	117,601	22,430
International & Great Northern	1,159	653,264	172,982	875,668	157,221	113,028	19,658	328,356	22,043	640,306	235,362	.....	22,000	213,362	15,536
Iowa Central	558	255,193	41,458	308,350	41,500	33,983	7,177	124,305	7,976	214,941	93,409	.....	7,382	86,027	82,648
Louisiana Ry. & Nav. Co.	350	90,925	17,375	119,950	29,011	12,937	4,811	46,557	6,055	99,371	20,579	.....	4,250	16,329	14,419
Midland Valley	324	88,523	28,461	122,755	17,807	23,313	1,783	31,131	4,387	78,421	44,334	184	8,000	36,518	38,839
Minneapolis & St. Louis	1,027	375,855	88,394	492,127	46,275	57,730	11,880	179,286	16,857	312,028	180,099	55	20,911	159,243	44,699
Missouri Pacific	3,881*	1,664,466	364,784	2,238,279	352,226	322,233	51,492	894,301	59,420	1,679,672	558,607	—2,867	80,401	475,339	.....
Mobile, Jackson & Kansas City	403	116,948	27,344	153,026	23,746	13,651	2,311	45,921	8,812	94,441	58,585	.....	6,708	51,877	—8,515
New Orleans & North Eastern	196	218,219	49,510	291,550	28,739	46,302	8,230	91,640	10,906	185,818	105,732	.....	8,500	97,232	10,404
New Orleans Great Northern	275†	82,439	28,261	117,381	20,981	18,689	1,950	29,062	4,427	75,109	42,272	—99	700	41,473	38,563
Pecos & Northern Texas	152	126,832	20,292	151,492	23,764	19,653	1,979	44,290	4,153	93,840	57,652	.....	1,369	56,283	22,923
St. Joseph & Grand Island	319	93,448	34,420	137,466	33,292	16,638	6,727	55,149	5,038	116,844	20,622	—124	6,619	13,879	—27,892
St. Louis, Brownsville & Mexico	456	101,916	37,581	145,543	39,280	10,703	2,850	40,619	7,071	100,523	45,020	.....	3,600	41,420	20,270
St. Louis, Iron Mtn. & Southern	2,610	1,821,359	409,755	2,420,798	297,794	279,611	50,629	684,986	64,754	1,377,774	1,043,024	—3,665	70,366	968,993	278,714
San Antonio & Aransas Pass	727	276,710	90,349	385,724	61,059	44,776	4,620	132,194	8,377	251,026	134,698	.....	9,000	125,698	7,247
San Pedro, Los Angeles & Salt Lake	1,105	407,449	191,188	641,198	114,769	110,483	29,688	219,366	15,999	490,305	150,893	—3,711	24,604	122,577	—4,875
Santa Fe, Prescott & Phoenix	257	96,251	31,651	134,352	18,917	9,623	3,864	31,624	5,074	69,102	65,250	.....	10	65,240	5,881
Seaboard Air Line	2,987‡	1,236,181	344,239	1,734,707	227,048	238,437	57,942	530,096	53,839	1,107,362	627,345	—5,395	59,418	562,532	182,056
Southern Indiana	237	109,625	14,096	124,966	16,099	18,480	3,118	32,072	4,623	74,392	50,574	— 26	6,928	43,619	14,065
Southern Kansas Ry. of Texas	125	131,338	18,580	153,305	20,892	24,747	1,804	44,188	3,745	95,376	57,929	.....	1,772	56,157	32,487
Spokane, Portland & Seattle	420§	224,036	62,421	298,435	53,380	29,365	3,711	100,017	7,349	193,822	104,613	—11,869	39,332	53,412	37,040
Tennessee Central	292	93,455	29,476	129,027	18,717	15,065	2,993	38,240	8,202	83,217	45,810	.....	4,199	41,611	29,382
Texas Central	268	77,285	31,494	115,597	11,803	12,169	1,573	31,388	3,820	60,753	54,844	.....	3,074	51,770	—11,449
Vicksburg, Shreveport & Pacific	171	76,100	44,206	131,098	23,431	25,365	3,115	34,767	4,571	91,249	39,849	.....	6,300	33,549	4,407
Virginian	444‡	143,218	17,736	169,732	27,776	31,193	6,138	50,684	7,630	123,421	46,311	388	15,000	31,699	.....
Western Maryland	543	486,543	56,918	569,809	69,940	73,971	7,057	170,857	17,500	339,325	230,484	.....	17,500	212,984	53,505
FIVE MONTHS OF FISCAL YEAR.															
Alabama & Vicksburg	143	$447,372	$203,688	$698,725	$114,004	$107,959	$17,815	$213,513	$25,586	$478,877	$219,848	.....	$21,250	198,598	$67,769
Ann Arbor	301	483,002	233,671	773,892	124,051	85,723	21,765	254,128	21,313	506,980	266,912	$14,596	61,653	219,855	17,638
Atlantic & St. Lawrence	167	338,702	158,954	543,553	198,733	60,145	14,111	144,171	12,993	430,153	113,400	.....	32,178	81,222	44,888
Charleston & Western Carolina	340	468,321	139,824	643,516	149,208	82,201	14,771	209,791	17,866	473,837	169,679	.....	22,375	147,304	35,198
Chicago, Cincinnati & Louisville	285	508,702	151,394	696,047	133,600	103,720	44,266	283,464	29,339	594,389	101,657	.....	17,025	84,633	122,885
Chicago, Peoria & St. Louis	255	582,406	155,413	771,353	109,228	150,483	31,980	271,477	25,951	589,119	182,234	.....	20,750	161,484	72,512
Cincinnati Northern	248	424,358	106,492	557,163	80,960	99,026	14,863	183,885	13,295	392,029	165,134	.....	20,500	144,634	88,071
Cleveland Terminal & Valley	93	383,515	81,906	552,148	82,075	65,308	7,994	202,724	9,774	367,875	184,273	.....	17,015	167,258	23,765
Detroit, Grand Haven & Milwaukee	190	502,074	285,554	897,520	132,190	118,556	29,387	330,163	31,869	642,165	255,355	182	13,636	241,901	40,571
Detroit, Toledo & Ironton	441	576,510	76,534	702,716	144,558	107,897	15,298	305,791	20,516	594,060	108,656	—127	32,552	75,977	—16,107
Grand Trunk Western	336	1,575,935	853,872	2,593,717	323,551	365,231	114,258	893,675	69,781	1,766,496	827,221	—2,629	145,950	678,642	32,319
International & Great Northern	1,159	2,702,947	836,815	3,762,963	655,515	579,857	91,785	1,442,007	105,441	2,874,605	888,358	.....	106,000	782,358	—84,556
Iowa Central	558	1,156,733	257,099	1,476,450	208,641	210,211	44,558	558,808	43,832	1,066,050	410,400	.....	37,018	373,382	106,081
Louisiana Ry. & Nav. Co.	350	422,847	80,597	560,035	112,641	63,879	24,131	223,576	26,839	451,066	108,969	.....	18,650	90,319	100,204
Midland Valley	324	394,281	138,615	560,623	92,699	111,291	9,414	148,772	22,579	384,755	175,858	—434	40,000	135,434	109,706
Minneapolis & St. Louis	1,027	1,563,867	614,229	2,318,736	243,113	229,638	66,131	793,350	67,463	1,399,695	919,042	—544	101,149	817,348	138,563
Missouri Pacific	3,881*	6,499,645	1,683,850	8,977,303	1,272,991	1,320,859	218,134	3,236,113	221,270	6,269,367	2,707,936	—13,070	301,504	2,393,362	.....
Mobile, Jackson & Kansas City	403	486,952	140,521	674,180	106,044	64,168	10,774	204,627	43,005	428,618	245,562	.....	21,235	224,327	40,915
New Orleans & North Eastern	196	1,037,225	257,383	1,399,612	141,799	228,691	42,150	472,610	50,732	935,982	463,630	.....	42,100	421,530	89,760
New Orleans Great Northern	275†	367,871	149,994	547,539	111,023	76,301	9,713	140,194	22,797	360,028	187,511	—427	4,500	182,584	155,095
Pecos & Northern Texas	152	569,733	120,555	715,452	107,922	90,618	8,317	190,228	19,564	416,649	298,803	.....	6,502	292,301	94,866
St. Joseph & Grand Island	319	498,247	193,950	748,870	161,260	77,078	32,195	264,664	21,751	556,948	191,922	346	27,189	165,079	—99,650
St. Louis, Brownsville & Mexico	456	360,411	177,109	572,352	152,496	52,988	12,882	194,017	31,796	444,179	128,173	.....	18,000	110,173	19,476
St. Louis, Iron Mtn. & Southern	2,610	8,015,075	2,229,296	11,098,837	1,619,993	1,556,236	272,686	3,249,989	331,212	7,030,116	4,068,721	—23,549	353,330	3,691,842	658,240
San Antonio & Aransas Pass	727	1,262,428	456,213	1,807,810	243,963	214,840	22,622	626,005	44,235	1,151,665	656,145	.....	45,000	611,145	—37,404
San Pedro, Los Angeles & Salt Lake	1,105	1,905,712	1,353,578	3,469,245	561,450	513,623	140,377	1,068,302	81,742	2,365,494	1,103,751	—7,165	132,324	964,262	244,179
Santa Fe, Prescott & Phoenix	257	414,552	147,681	599,100	95,711	44,015	14,752	148,334	25,367	328,179	270,921	.....	174	270,747	21,956
Seaboard Air Line	2,987‡	5,388,528	1,665,371	7,761,266	1,122,631	1,053,298	275,422	2,427,474	259,752	5,138,577	2,622,689	—12,728	297,090	2,312,871	766,156
Southern Indiana	237	517,999	78,010	604,566	78,299	82,341	11,107	151,322	24,505	347,574	256,992	—823	34,642	221,527	90,631
Southern Kansas Ry. of Texas	125	569,397	105,545	691,874	82,588	104,858	8,699	207,538	17,763	421,446	270,428	.....	8,420	262,008	152,747
Spokane, Portland & Seattle	420§	1,068,930	348,248	1,468,353	229,333	117,355	14,950	453,551	30,089	845,278	623,075	—8,840	135,143	479,092	429,114
Tennessee Central	292	445,201	174,226	649,897	83,640	75,299	18,000	199,516	40,942	417,397	232,500	.....	20,998	211,502	62,694
Texas Central	268	251,256	163,619	448,170	91,211	65,071	8,111	138,964	19,003	322,360	125,810	.....	15,037	110,773	—64,243
Vicksburg, Shreveport & Pacific	171	350,259	203,933	600,397	100,220	110,543	16,731	169,741	21,236	418,471	181,926	.....	31,500	150,426	30,663
Virginian	444‡	621,413	91,223	751,053	136,113	136,609	29,504	213,548	36,598	552,372	198,681	2,488	53,000	148,169	.....
Western Maryland	543	2,340,856	442,287	2,910,553	390,430	382,501	48,511	837,047	69,146	1,727,635	1,182,918	.....	87,500	1,095,418	144,662

* Began operations Aug. 9, 1909, consolidation of Central Branch Ry. and Missouri Pacific Ry. and branches. † Mileage operated Nov. 30, 1908, 113. ‡ Includes Atlanta & Birmingham Air Line; Catawba Valley Ry.; Tallahassee, Perry & Southeastern Ry.; Plant City, Arcadia & Gulf Ry., and Florida West Shore Ry. from Nov. 1, 1909. § Mileage operated Nov. 30, 1908, 272. ‡ Began regular operations July 1, 1909. — Indicates Deficits, Losses and Decreases.

Need of Science and Economy in Farming.

I have noted with regret expressions of satisfaction and self-congratulation upon the part of the press over the fact that the aggregate value of farm products has increased from $4,417,000,000 in 1898 to $8,760,000,000 in 1909, unmindful of the disturbing fact that this increase in value is the result almost entirely of increased acreage and a startling increase in price per bushel, and not the result of an increased yield per acre. This failure to increase the production of the nation's farms by increasing the number of bushels per acre is steadily and rapidly increasing the cost of living. Given the same intelligent methods of seed selection, fertilization and cultivation, our lands will produce as large crops as those of any other nation; but during the last ten years our farms have produced an average yield of wheat of less than 14 bushels per acre. England produces more than 32, Germany about 28, the Netherlands more than 34, and France approximately 20. It is the same with other crops. Potatoes are a food staple of the poor man. Our average yield is 85 bushels per acre, while Germany, Belgium and Great Britain produce 250 bushels. Germany, with an arable area no greater than some of our largest states, produces approximately two billion bushels of potatoes annually, while the aggregate crop of the United States averages barely 275 million bushels; and in the year ended June 30, 1909, we imported 8,400,000 bushels. The only salvation for the country is an immediate awakening to an appreciation of the overshadowing importance of this condition, followed by a systematic campaign of education.

I am going to ask President Schurman to furnish men among the Cornell graduates to direct the work of developing the abandoned and wornout farms in this state, which the railway company was buying. The movement is not a philanthropic one, it is one of self-preservation. As soon as we have sufficiently improved one farm we shall sell it and take up another in an adjoining county. The value of farm products could be doubled without increasing the acreage and New York should be a leader in this work. Maine has raised 225 bushels of potatoes an acre, as against 82 bushels an acre in New York. There should be a first-class manual training school to every high school, college or university, providing accommodation therein for every child in the community with attendance compulsory. —*W. C. Brown*, at Cornell University.

INTERSTATE COMMERCE COMMISSION.

The commission in concluding its annual report on the street railways of the District of Columbia says: "We renew our recommendation of a year ago that this commission be relieved of the duty of supervising the street railway service of the District of Columbia. The Interstate Commerce Commission is charged with the responsibility of regulating the great interstate carriers of the country, an undertaking of sufficient magnitude to demand all of the time and personal attention of the members of the commission. The supervision of a city's local street-car service presents a problem essentially different in character and entirely foreign to the purpose for which this commission was established. Moreover, as pointed out in our last report, the members of the commission must necessarily be absent from Washington for extended periods throughout the year, thus rendering impossible that intimate touch with local conditions which is believed to be necessary if the intent of the act of May 23, 1908, is to be effectuated. These considerations prompt us to strongly urge that Congress place this work and responsibility in some other hands."

Amending Original Proceedings.

Louis Werner Saw Mill Co. v. Illinois Central. Opinion by Commissioner Clements.

The rates having been found to be unreasonable, complainant subsequently filed its petition for reparation, but upon its application the case was dismissed without prejudice. Upon motion for reinstatement *nunc pro tunc* it was so ordered.

The commission has no authority to permit a complaint to be amended to make the original proceedings embrace a new cause of action even though relating to the same subject matter.

The commission has no jurisdiction to deal with complaints for reparation in any way unless filed with or presented to it within the period specified in the statute.

The commission is not vested with the powers of a court of equity to relieve from hardships resulting from improvident arrangements between the parties. (17 I. C. C., 388.)

Increased Rates on Cotton Seed Oil Reasonable.

Memphis Cotton Oil Co. et al. v. Illinois Central et al. Opinion by Commissioner Harlan.

The long-continued maintenance of a lower rate raises no presumption of law that a newly established higher rate is unreasonable. The fact that the lower rate remained undisturbed for many years has probative value and considered merely as evidence must ordinarily have much weight, in the absence of some explanation showing the propriety and need of an increased rate. But in every case all pertinent facts must be considered before an increased rate may be held to be unreasonable and therefore unlawful. On the facts shown of record the present increased rates on cotton-seed oil from Memphis to Louisville, Cincinnati and Chicago are not found to be unreasonable, although lower rates between those points had been in effect for many years. (17 I. C. C., 313.)

Des Moines Case Decision Followed.

Ottumwa Commercial Association v. Chicago, Burlington & Quincy et al. Opinion by Commissioner Harlan.

The through charges under the class rates from points east of the Indiana-Illinois state line to Ottumwa, in the state of Iowa, found to be unreasonable and excessive; it is also found that the through charges are unreasonable and excessive because of the excessive proportional class rates applicable from the Mississippi river crossings of the defendants on through movements to destination. Defendants are therefore required to reduce the latter rates for the future. *Greater Des Moines Committee v. C., R. I. & P. Ry. Co.*, 17 I. C. C., 54 and 57, cited and followed. (17 I. C. C., 413.)

Reduction in Cotton Rate from Jackson, Tenn.

Railroad Commission of Tennessee v. Ann Arbor et al. Opinion by Commissioner Prouty.

Covington, Brownsville and Jackson, in Tennessee, are situated upon a line drawn east from the Mississippi river, Covington 16 miles from the river, Brownsville 20 miles east of Covington, and Jackson 25 miles east of Brownsville; the present rate on compressed cotton to New England mills is 60½ cents from Covington, 60½ cents from Brownsville and 70 cents from Jackson. The complaint is that this adjustment of rates is an unjust discrimination against Jackson. Looking at the entire situation, the present adjustment of rates between Brownsville and Jackson unduly discriminates against Jackson, and the rate to New England destinations from Jackson ought not to exceed that from Brownsville by more than 5 cents per 100 lbs. (17 I. C. C., 418.)

Jurisdiction Over Station Facilities.

William C. Snook v. Central of New Jersey. Opinion by Commissioner Harlan.

The general rule that a tribunal, whose authority is invoked by a complaint filed before it, must determine whether the subject matter is within its jurisdiction before it may consider the merits of the controversy does not in all cases necessarily control an administrative body like this commission.

Following the course pursued in *Jones v. St. Louis & San Francisco*, 12 I. C. C., 144, and without determining at this time whether the commission has jurisdiction to require interstate carriers to erect or to continue to maintain station facilities at particular points, the facts of record here have been examined for the purpose of ascertaining whether, assuming such power to exist in the commission, enough has been shown to warrant an order requiring the defendant to

* Began operations Aug. 9, 1909, consolidation of Central Branch Ry. and Missouri Pacific Ry. and Missouri Pacific Ry. ‡ Began regular operations July 1, 1909. — Indicates Deficits, Losses and Decreases.

continue to maintain station facilities at Roycefield, N. J. On all the testimony of record the discontinuance of the defendant's agency station at the point in question cannot be regarded as a violation of the act to regulate commerce. (17 I. C. C., 375.)

STATE COMMISSIONS.

The Chicago, Rock Island & Pacific, the St. Louis & San Francisco, the Midland Valley, the Atchison, Topeka & Santa Fe, the Missouri, Kansas & Texas and the Kansas City Southern have been cited for contempt by the Oklahoma Corporation Commission because they have not complied with the order requiring them to keep their accounts according to a method prescribed by the commission. The charge is that they did not separate the revenue derived both from state mail and express business from that derived from interstate mail and express business. At a hearing on January 13 accounting officers of the roads testified that it is impossible for them to comply with the commission's order. They stated that the mail and express accounts were kept for the entire system and the cost apportioned to each state and that the roads had never tried to ascertain the relative revenue from state and interstate express and mail business.

Wisconsin: Shipper's Duty to Inspect Tariffs.

F. Mayer v. Illinois Central and the Chicago & North Western.

Petition alleging overcharge on a carload of scrap iron from Monroe, Wis., to West Bend, Wis. Through an error petitioner had been quoted a joint rate of 7 cents per 100 lbs., instead of 10 cents, the lawful published rate.

It is held that the petitioner was not justified in relying on the erroneous quotation, and that he should have examined the tariffs which the railway is required to keep in every station. The rate charged, however, was above the level under which heavy and low grade articles will move, higher than the ordinary commodity rates on scrap iron, and higher than the cost of transportation warrants; a joint rate of 8 cents per 100 lbs. would have been a reasonable charge. Refund ordered on this basis. (3 W. R. R. C., 268.)

Wisconsin: Relation of Concentration Rates to Other Rates.

G. C. Fergot v. Chicago & North Western.

Petition claimed that the rate of 4½ cents per 100 lbs., exacted by the respondent from the petitioner for a carload of wood bolts from Embarrass to Menasha, was unreasonable and excessive in comparison with a rate of 1½ cents per 100 lbs., which had heretofore been charged for such shipments and which was still in effect from other points producing wood bolts. Respondent contended that the 1½-cent rate was a transit rate and therefore not comparable with the regular class rate of 4½ cents.

The commission holds that concentration rates are not independent rates in and of themselves, and that they depend on the rates on the products out. Where such products cannot be shipped over the same line it is not unjust discrimination on part of the carrier to demand higher rates; but the rate in this case was higher than the value of the commodity warranted and higher than the rates charged for other commodities of a similar character. It was also higher than the cost of the transportation warranted. The respondent is ordered to reduce its rate of charge on the carload of bolts involved from 4½ cents to 3 cents per 100 lbs. and refund to the petitioner the difference between these two rates. (3 W. R. R. C., 248.)

COURT NEWS.

Judge John F. Philips in the United States circuit court at Kansas City January 22 issued an order restraining the Missouri, Kansas & Texas from refusing to accept liquor shipments consigned to Kansas and Oklahoma. This road sometime ago issued an order directing its representatives to refuse shipments of liquor for Oklahoma and Kansas, which are prohibition states. Judge Philips held that as it is a common carrier it cannot refuse such consignments.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

A. S. Steirer has been elected assistant secretary and auditor of the Gulf & Interstate, with office at Galveston, Tex., succeeding O. C. Van Zandt, resigned.

Frank H. Moore has been appointed assistant attorney of the Kansas City Southern, with office at Kansas City, Mo., succeeding F. H. Wood, resigned to accept service elsewhere.

W. J. Shotwell, general agent of the Western Pacific and the Denver & Rio Grande at San Francisco, Cal., has been appointed assistant to the vice-president in charge of traffic of the Western Pacific, with office at San Francisco.

L. V. Porter has been appointed assistant auditor of the Lake Shore & Michigan Southern, the Lake Erie, Alliance & Wheeling, the Chicago, Indiana & Southern, the Indiana Harbor Belt and the Mahoning Coal Railroad, with office at Cleveland, Ohio, succeeding G. M. Glazier, promoted.

Edward M. Wise, whose appointment as vice-president and general manager of the Pan-American at Gamboa, Oaxaca, Mex., has been announced in these columns, was born on October 31, 1871, at Decatur, Ala. He was educated in the common schools of Morgan county, Alabama, and began railway work in February, 1890, with the Louisville & Nashville, since which time he has been consecutively to August, 1893, operator and agent of the North and South Alabama division of the Louisville & Nashville. On September 15, 1893, he went to the Chicago, Rock Island & Pacific at Fort Worth, Tex., as operator and bill clerk, and in December of the same year he was made operator and claim clerk of the Gulf, Colorado & Santa Fe at Galveston. In October, 1894, he became joint foreman of terminals of the same company at Galveston, leaving that position in February, 1899. The following month he went to the Mexican Central, now a part of the National Railways of Mexico, as chief clerk and agent at Tampico, Mex., and two years later was made agent at Mexico City of the National Railroad of Mexico, also now a part of the National Railways of Mexico. From June to October, 1902, he was terminal superintendent of the Tehuantepec National at Puerto, Mex., leaving that position on October 20 to become terminal superintendent of the Interoceanic Railway, now part of the National Railways of Mexico, at Vera Cruz. In March, 1903, he returned to the Tehuantepec National as superintendent, with office at Rincon Antonio, Mex., and from August 1, 1904, to November 20, 1908, was superintendent of the Mexican Railway at Mexico City, leaving that position to become assistant to the president of the Pan-American at Gamboa, from which position he was promoted to vice-president and general manager.

Edward M. Wise.

William Hodgins Biggar, whose appointment as general counsel of the Grand Trunk and the Grand Trunk Pacific was recently announced in these columns, was born on September 19, 1852, at Murray, Ont. Mr. Biggar was educated in the Trenton high school and later attended Canada college at Toronto. He was a law partner of the solicitor of the Grand Trunk in 1881, and became assistant general counsel of the

Grand Trunk on January 1, 1903. He was appointed general solicitor on December 1, 1904, which position he held at the time of his recent appointment.

H. E. Byram, assistant to the second vice-president of the Chicago, Burlington & Quincy at Chicago, has been appointed assistant to the first vice-president, and will have jurisdiction over the operating departments. C. G. Burnham will continue as assistant to the first vice-president and will have jurisdiction over the traffic departments.

Robert S. Logan, whose appointment as assistant to president of the Grand Trunk has been announced in these columns, is also assistant to president of the Grand Trunk Pacific, with office at Montreal, Que. Mr. Logan was born on February 13, 1864, at St. Louis, Mo. He was educated in the St. Louis grammar schools and began railway work on October 1, 1885, as a clerk in the general manager's office of the Wabash, St. Louis & Pacific, now a part of the Wabash. He was appointed secretary to the general manager of the Wabash on December 1, 1890, and went to the Grand Trunk on July 1, 1896, in the same capacity. He was made assistant to the general manager of the same company on December 1, 1900, and the following March was elected vice-president and general manager of the Central Vermont. On March 17, 1902, he was appointed assistant to the second vice-president of the Grand Trunk, which position he held at the time of his recent appointment.

Operating Officers.

C. T. Dabney, whose appointment as special agent on the staff of the general manager of the Pennsylvania Railroad was recently announced in these columns, was born in Hanover county, Va. He began railway service in June, 1867, since which time he has been consecutively to August, 1881, with the Chesapeake & Ohio as agent and operator, traveling auditor and chief clerk to the general superintendent. From August, 1881, to June, 1887, he was with the Virginia Midland, now a part of the Southern, as chief clerk and master of transportation, and from June, 1887, to August, 1889, he was superintendent of the Eastern division of the Chesapeake & Ohio. From August, 1889, to June, 1890, he was general manager of a street railway at Richmond, Va., and from November, 1890, to August, 1900, was superintendent of the Buffalo and Rochester divisions of the Western New York & Pennsylvania. He entered the service of the Pennsylvania in August, 1900, when the Western New York & Pennsylvania came under the control of the Pennsylvania. Mr. Dabney was superintendent of the Chautauqua division until 1903, when he was made superintendent of the River and Low Grade divisions. In April, 1907, he became superintendent of the Central division of the Philadelphia, Baltimore & Washington, which position he held at the time of his recent appointment.

C. T. Dabney.

J. H. McCloughlin has been appointed an assistant superintendent of the Montana division of the Oregon Short Line, with office at Pocatello, Idaho, succeeding C. P. A. Lonergan, resigned to accept service elsewhere.

J. B. Harris, trainmaster of the Chesapeake & Ohio, at Thurmond, W. Va., has been appointed chief car distributor at Hinton, in charge of coal car supply and distribution on the entire line. S. E. Dearien, assistant trainmaster at Thurmond, succeeds Mr. Harris, and E. G. Chambers has been appointed road foreman of engines and assistant trainmaster of the New river coal district, succeeding Mr. Dearien.

William M. Whitenton, whose appointment as manager of the Southern and Choctaw districts of the Chicago, Rock Island & Pacific, with office at El Reno, Okla., has been announced in these columns, was born September 22, 1867, in Victoria county, Texas. He received his education in the public schools and began railway work in 1883 as water boy on a work train with the Missouri, Kansas & Texas. He learned telegraphy and then became operator and agent. In 1885 he was made despatcher and later acted as chief despatcher and conductor on the Missouri, Kansas & Texas, the Texas & Pacific and the Mexican Central. In 1900 he was made chief despatcher and a year later trainmaster of the Choctaw, Oklahoma & Gulf, now a part of the Rock Island. He was appointed superintendent of the Pan Handle division of the Rock Island in October, 1903, and was transferred to the Arkansas division in July of the following year. A year later he was transferred to the Missouri division, and in September, 1907, was promoted to the general superintendency of the Choctaw district at Little Rock, Ark., from which position he was promoted in December, 1909, to the position of manager of the Southern & Choctaw districts of the C., R. I. & P.

W. M. Whitenton.

F. N. Melius, assistant trainmaster of the New York Central & Hudson River, has been appointed trainmaster, with office at Poughkeepsie, N. Y., succeeding D. W. Hempstead, resigned. W. Williams succeeds Mr. Melius, with office at New York.

W. K. McCoy, whose appointment as superintendent of the River division of the New York Central & Hudson River at Weehawken, N. J., was recently announced in these columns, was born in Allegheny City, Pa., about 40 years ago. He was educated in the common schools of Ohio and later attended the Northwestern University. He began railway work with the West Shore in July, 1885, as telegraph operator and clerk at Buffalo, N. Y., and was promoted to train despatcher in 1887, with office at Newark, N. Y. In 1889 he was made passenger conductor, and the following year became chief train despatcher at Syracuse, with jurisdiction over the line from Ravena to Buffalo. He was appointed trainmaster of the Mohawk division of the West Shore in February, 1897, at Syracuse, and in March, 1903, was transferred to Utica, in charge of the Mohawk & Malone; part of the New York Central & Hudson River. In October, 1906, he was made assistant superintendent of the Mohawk division

W. K. McCoy.

of the New York Central & Hudson River, the West Shore and the Mohawk & Malone, with office at Albany, which position he held at the time of his recent appointment.

V. T. Kissinger, assistant superintendent of telegraph of the Chicago, Burlington & Quincy at Lincoln, Neb., has been appointed superintendent of telegraph, with office at Chicago. He succeeds as superintendent of telegraph W. W. Ryder, resigned to go with another company.

W. N. Bannard, whose appointment as special agent on the staff of the general manager of the Pennsylvania Railroad was recently announced in these columns, was born on December 30, 1848, at New York. He graduated from the Massachusetts Institute of Technology, Boston, in 1869, and entered the service of the Pennsylvania as rodman in September of the same year. From 1872 to 1875 he was resident engineer of the West Jersey & Seashore, leaving that position in 1875 to become engineer maintenance-of-way on the same road. In 1883 he was appointed superintendent of the Camden & Atlantic, and the following year was made superintendent of the Amboy division. He was appointed superintendent of the Altoona division in 1891, and in June, 1895, was made superintendent of the Maryland division of the Philadelphia, Baltimore & Washington, which position he held until his recent appointment.

W. N. Bannard.

F. P. Abercrombie, whose appointment as special agent on the staff of the general manager of the Pennsylvania Railroad was recently announced in these columns, was born at Fort Towson, Okla., and graduated from the Rensselaer Polytechnic Institute, Troy, N. Y., in 1873. After graduation he entered the service of the Pennsylvania as assistant supervisor, and in 1875 he was made assistant supervisor of the New York division. The following year he was appointed assistant supervisor of the Baltimore & Potomac, and in January, 1877, was made supervisor. In August, 1880, he was made supervisor of the West Jersey & Sea Shore, and the following December was appointed assistant engineer of that road. He became assistant engineer of the Sunbury and Shamokin divisions in 1885, and in 1891 assistant engineer of the Eastern and Susquehanna divisions, becoming superintendent of the Bedford division in 1896. Three years later he was made superintendent of the Cambria and Clearfield divisions, and the following year superintendent of the Amboy division. In February, 1902, he became superintendent of the New York division, from which position he has been promoted to special agent and assigned to the general manager's office.

F. P. Abercrombie.

J. C. Johnson, whose appointment as superintendent of telegraph of the Pennsylvania Railroad at Philadelphia, Pa., succeeding J. B. Fisher, was announced in the *Railway Age Gazette* in its issue of January 14, page 118, was born on April 26, 1866, at Curtin, in Center county, Pennsylvania. He entered the service of the Pennsylvania Railroad on January 5, 1885, as a telegraph operator on the Schuylkill division. In June, 1887, he was appointed train despatcher of the Schuylkill division, and on January 1, 1903, was made assistant trainmaster of the same division. He was appointed division operator and assistant trainmaster of the Schuylkill division on November 16, 1905, remaining in that position until October 24, 1907, when he became chief clerk to the superintendent of telegraph at Philadelphia, which position he held at the time of his recent appointment.

J. C. Johnson.

J. B. Fisher, whose appointment as superintendent of the New York division of the Pennsylvania, succeeding F. P. Abercrombie, was recently announced in these columns, entered the service of the Pennsylvania Railroad as a clerk in the general superintendent's office at Altoona in 1883. He remained in this position until 1900, when he was made chief clerk to the freight trainmaster of the Middle division, and two years later was appointed assistant freight trainmaster. In 1903 he was appointed freight trainmaster of the Middle division and on April 1, 1907, was made superintendent of telegraph at Philadelphia, which position he held at the time of his recent appointment.

J. B Fisher.

Traffic Officers.

L. Sevier has been appointed a general agent of the Alabama Great Southern, with office at Birmingham, Ala.

H. A. Willie has been appointed a traveling freight agent of the Wabash, with office at Salt Lake City, Utah.

C. W. Hay has been appointed a traveling freight agent of the Louisville & Nashville, with office at Frankfort, Ky.

H. M. Gregory has been appointed general freight agent of the Jonesboro, Lake City & Eastern, with office at Jonesboro, Ark.

J. H. Geagan has been appointed general freight and passenger agent of the Tremont & Gulf, with office at Winnfield, La., succeeding Alfred Mead, resigned.

E. C. Robinson has been appointed industrial and immigration commissioner of the Louisiana Railway & Navigation Company, with office at Shreveport, La.

H. Page has been appointed general agent of the Missouri,

Kansas & Texas, with office at Dallas, Tex., succeeding G. A. Carter, resigned to accept service with another company.

L. B. Williams has been appointed a soliciting freight agent and I. Benson has been appointed a traveling freight agent of the St. Louis & San Francisco, with office at Cincinnati, Ohio.

J. E. Gosling, contracting freight agent of the New York Central lines at Salt Lake City, Utah, has been appointed agent of the Kanawha Despatch, with office at Salt Lake City.

L. A. Robinson, general passenger agent of the Pittsburgh & Lake Erie, at Pittsburgh, Pa., has been appointed also general passenger agent of the Lake Shore & Michigan Southern, effective February 1.

C. K. Junkins, formerly general agent of the El Paso & Southwestern at San Francisco, Cal., and J. C. Caniff have both been appointed contracting freight agents of the Western Pacific and the Denver & Rio Grande, with office at San Francisco.

William Albert Terry, whose appointment as assistant freight traffic manager of the New York Central Lines West of Buffalo, with office at Chicago, has been announced in these columns, was born March 20, 1864, in Huron county, Ohio. He began railway work in 1879 as telegraph operator on the Canada Southern, now a part of the Michigan Central, since which he has been consecutively to February, 1886, in the train despatcher's office on the Ft. Wayne & Jackson, now a part of the Lake Shore & Michigan Southern, at Jackson, Mich.; in the freight department of the Wheeling & Lake Erie at Marietta, Ohio; train despatcher at Cambridge, Ohio, and ticket agent at Marietta, Ohio, with the latter road. From September, 1890, to January, 1891, he was in the office of the master car builder of the Pittsburgh & Western, now a part of the Baltimore & Ohio, and he was then made commercial agent of the Wheeling & Lake Erie at Pittsburgh. Four years later he went as commercial agent to the Cincinnati, Hamilton & Dayton and the Cleveland, Lorain & Wheeling, now a part of the Baltimore & Ohio. He was made assistant general freight agent of the Pittsburgh & Lake Erie in September, 1897, and in January, 1903, became general freight agent, which position he held until his recent appointment as assistant freight traffic manager of the New York Central Lines West of Buffalo.

W. A. Terry.

T. C. Clifford, superintendent of dining cars of the Erie at Jersey City, N. J., has been appointed also general baggage agent of the Erie and controlled lines, with offices at Jersey City, effective February 1.

G. A. Mitchell, assistant general passenger agent of the Northern Pacific at St. Paul, Minn., has been appointed an assistant general freight agent, with office at St. Paul, succeeding J. O. Dalzell, assigned to other duties.

T. E. Eismann has been appointed chief of the tariff bureau of the Michigan Central, with office at Detroit, Mich., succeeding N. D. Chapin, transferred to a position in the freight traffic department of the New York Central Lines in New York.

J. W. Daly, general passenger agent of the Lake Shore & Michigan Southern, at Cleveland, Ohio, has been appointed to the new position of assistant passenger traffic manager of the New York Central Lines west of Buffalo, with office at Chicago, effective February 1.

R. M. Baumgardner has been appointed New England freight agent of the Toledo, St. Louis & Western, the Chicago & Alton, the Minneapolis & St. Louis and the Iowa Central, with office at Boston, Mass. F. B. Townsend has been appointed coal freight agent, with office in Chicago.

Bernard Edward Morgan, whose appointment as general freight agent of the New York, Chicago & St. Louis, with office at Cleveland, Ohio, has been announced in these columns, began railway work October 1, 1884, with the New York, Chicago & St. Louis. In March, 1888, he was appointed contracting agent of the Interstate Despatch Line at Chicago, and three years later went with the Traders' Despatch as traveling freight agent at Chicago. In September, 1893, he was made western freight agent of the New York, Chicago & St. Louis at Omaha, Neb., which position he held until February, 1901. He was then made commercial agent and later assistant general freight agent, with office at Chicago, and in September, 1909, was appointed manager of the Traders' Despatch, from which position he has recently been promoted.

B. E. Morgan.

Eugene Fox, whose appointment as general freight and passenger agent of the El Paso & Southwestern and the Morenci Southern, with office at El Paso, Tex., has been announced in these columns, was born January 18, 1877, at Winterset, Iowa. He was educated in the public schools at Stuart, Iowa, and Hutchinson, Kan., and began railway work at Hutchinson in June, 1898, with the Chicago, Rock Island & Pacific as a yard clerk. He was then consecutively weigh master, ticket clerk, bill clerk and cashier for the freight department. In September, 1899, he became traveling freight agent, with office at Salt Lake City, Utah, and the following year was transferred to St. Louis, Mo. In October, 1902, he was appointed joint traveling freight and passenger agent of the Rock Island and the El Paso & Northeastern at El Paso, Tex. When the El Paso & Northeastern and the El Paso & Southwestern were consolidated, in June, 1905, he was appointed general agent for both lines at Los Angeles, Cal., and the next year he was appointed general agent at Chicago, which position he held until May, 1909, when he was made assistant general freight agent at El Paso, from which position he has recently been promoted.

Eugene Fox.

Charles E. Perkins, whose appointment as general freight agent of the St. Louis, Iron Mountain & Southern, with office at St. Louis, Mo., has been announced in these columns, was born March 31, 1871, in Chicago. He prepared for college at Williston Seminary, North Hampton, Mass., and spent two years at Amherst College. He began railway work in October, 1891, with the Kansas City, Ft. Scott & Memphis, now a

part of the Frisco, and remained in the tariff department of that road for five years. He then became chief clerk to the general agent of the St. Louis & San Francisco at Kansas City, and in October, 1897, became chief tariff clerk for the Kansas City, Pittsburgh & Gulf, now the Kansas City Southern; he was then promoted to chief clerk and later to assistant general freight agent. In March, 1909, he was appointed assistant general freight agent of the St. Louis, Iron Mountain & Southern, at St. Louis, which position he held until his recent promotion.

Engineering and Rolling Stock Officers.

P. C. Withrow has been appointed mechanical engineer of the Denver & Rio Grande, with office at Burnham station, Colo.

Richard Lanham, road foreman of engines of the St. Louis, Iron Mountain & Southern, at De Soto, Mo., has been appointed a master mechanic, with office at Paragould, Ark.

Arthur Caldwell has been appointed an assistant division engineer of the Baltimore & Ohio, with office at Washington, Ind., succeeding F. J. Parrish, resigned to engage in other business.

W. J. Bohan, electrical engineer of the Northern Pacific at St. Paul, Minn., has been appointed mechanical engineer, with office at St. Paul, succeeding J. E. O'Brien, resigned to go with another company.

W. L. Madill, supervisor of the Erie at Thompson, Pa., has been appointed supervisor of the Northern of New Jersey; the New Jersey & New York and the Piermont branch of the Erie, with office at Jersey City, N. J.

J. F. Sheahan, master mechanic of the Southern Railway at Knoxville, Tenn., has been appointed master mechanic of the International & Great Northern, with office at Palestine, Tex., succeeding F. S. Anthony, promoted.

J. W. Snyder, assistant supervisor of signals on the Pittsburgh division of the Pennsylvania Railroad at Pittsburgh, Pa., has been appointed supervisor of signals of the Conemaugh division, with office at Pittsburgh, succeeding B. F. Oler, transferred. Guy Toft succeeds Mr. Snyder, with office at Pittsburgh. G. M. Ball, Jr., has been appointed supervisor of division No. 9 on the Middle division, succeeding J. B. Hutchinson, Jr., promoted.

R. J. Arey, division engineer of the Atchison, Topeka & Santa Fe Coast Lines at San Bernardino, Cal., has been appointed engineer of the Grand division of the Coast Lines, with office at Los Angeles, Cal. This is a new office and Mr. Arey's territory is commensurate with that of the general superintendent's; he will relieve the chief engineer of direct charge of all division work. M. C. Bryan, assistant division engineer, succeeds Mr. Arey.

D. S. Watkins, division engineer of the Buffalo, Rochester & Pittsburgh at Du Bois, Pa., has been appointed engineer of construction, in charge of construction of new lines, relocation of existing lines and such other duties as may be assigned, with office at Du Bois. W. F. Pond, assistant engineer of bridges, at Rochester, N. Y., has been appointed office engineer, with office at Rochester. E. W. Hammond has been appointed division engineer of Divisions 1 and 2 and the Erie division, with office at Rochester, and G. C. Cleaver, assistant engineer of track, has been appointed division engineer of Divisions 3, 4 and 5, with office at Du Bois. The division engineers will have charge of track, bridges, buildings and water service. The offices of assistant engineer of track, and assistant engineer of bridges and buildings, have been abolished.

Purchasing Officers.

J. H. Guess, purchasing and fuel agent of the National Railways of Mexico at City of Mexico, Mex., has been appointed general purchasing agent of the Mexican International and the Interoceanic, with office at City of Mexico, and his former title has been abolished. A. Herrera has been appointed purchasing agent, with office at City of Mexico, succeeding Carl H. Smith, resigned. Henry Mel, material agent at Beaumont, Tex., has been appointed assistant purchasing agent, with office at Beaumont, and William Hollis has been appointed material and fuel agent of the National Railways of Mexico and the Mexican International, with office at Ciudad Porfirio Diaz, Mex.

OBITUARY.

Archer Baker, general European traffic manager of the Canadian Pacific, with headquarters in London, Eng., died on January 15 of congestion of the lungs and pneumonia at the age of 64 years. Mr. Baker was born in England, and came to Canada in 1871. He held several important positions in connection with the Canadian Pacific and other railways before he was appointed traffic manager in London. He was successful in organizing the emigration movement to Canada among foreigners.

E. P. Bryan, for about eight years, 1900-1908, vice-president of the Interborough Rapid Transit Co., at New York, died on January 23 at San Juan, Porto Rico. Mr. Bryan was born in Ohio in 1847. He began railway work in 1865 as telegraph operator on the Louisville & Nashville at Lebanon, Ky., and remained in the service of that company until 1895. Previous to August, 1891, he was agent at Frankfort, and from August, 1891, to the following March was superintendent of terminals at Louisville. He was appointed superintendent of terminals of the same company at St. Louis, Mo., in March, 1892, remaining in that position until November, 1895, when he was made vice-president and general manager of the Terminal Railroad Association of St. Louis. In May, 1900, he was chosen vice-president of the Interborough Rapid Transit Co., New York City, and organized the operating department of the subway lines, which were opened for business in the autumn of 1904. He was afterward promoted to the position of president. He resigned in 1908.

William Buchanan, superintendent of motive power of the New York Central & Hudson River for 18 years up to 1899, and one of the best known mechanical officers in the country, died last week Thursday, at his home in South Norwalk, Conn. Mr. Buchanan was born in Scotland, March 6, 1830. He came to this country when a boy and began railway work in the summer of 1847. In 1849 he was an apprentice in the shops of the Albany & Schenectady, but soon went to the Hudson River road, where he remained the rest of his active life. For three years he was machinist and shop foreman. In 1853 he became master mechanic, and in April, 1880, was made superintendent of motive power of the Hudson River and Harlem divisions. From April, 1881, to his resignation in May, 1899, he was superintendent of motive power and rolling stock of the whole system—the New York Central & Hudson River, the West Shore, the Rome, Watertown & Ogdensburg and the Dunkirk, Allegheny Valley & Pittsburgh. Mr. Buchanan was nearly, if not quite, the finest example of an early type. Beginning at the bottom, without preliminary education, he went to the top of the same department of the same railway and served the same employers, and their successors, for 52 years. While he never lost his ancestral inheritance of caution, persistence and some obstinacy, nevertheless this self-made Scot was not nearly so bigoted as such men are liable to be. He was probably prevented from becoming a bigot by his sweet kindliness and his strong liking for his friends and for human beings generally. This inevitably resulted in an increase of respect for the opinions of others. Buchanan's place as a designer of locomotives is a highly important one, in spite of his fundamental defect of a lack of such theoretical knowledge and training as would have enabled him to make independent scientific investigations. He is most often remembered as the man who developed to its utmost the efficiency of the American type (4-4-0) locomotive. He undoubtedly clung too long to that type when its availability was unequal to the economic requirements of increased power. When the West Shore railway was building, 28 years ago, it was to be a damaging rival of the New York Central, but it is an instance of Buchanan's broadminded scientific spirit that he gave to Howard Fry, the superintendent of motive power of the West Shore, every facility for studying New York Central locomotive operation. Howard Fry was a great scientific man, and the writer recalls Fry's judgment after spending a week in riding on Buchanan's freight locomotives between New York and Buffalo: "Nobody gets more out of a pound of coal than Buchanan does."

Railway Construction.

New Incorporations, Surveys, Etc.

ALGOMA CENTRAL & HUDSON BAY.—According to press reports work is to be started soon on the extension of this road north to a connection with the Canadian Pacific, about 200 miles. Surveys have been made from the present end of the track at Chippewa river, mile 69, in Ontario, north to Michipicoten, mile 103.65.

BOISE-BUTTE.—Incorporated in Idaho to build a line through Boise, Custer and Lemhi counties, in Idaho, thence northeast to Butte, Mont. S. H. Bracer, F. A. Dolph, G. T. Wiswell, C. Blackburn, all of Chicago; J. W. Gilbert, New York; J. P. Hornaday, Pittsburgh; J. E. Bell, Addison, Mich., and F. Weeks, Boston, Mass., are interested.

CHICAGO, MILWAUKEE & PUGET SOUND.—According to press reports contracts have been let to the Lorimer & Gallagher Co. and the J. H. Flick Co., both of Chicago, for filling in many of the wooden trestles with earth and rock, reducing grades, lessening curves and putting in heavier rail on the line between Plummer, Idaho, and Seattle, Wash. The work is to be started this spring and finished by October for the operation of through passenger trains and fast mail service.

COLEMAN, LLANO & SOUTHERN.—This company, which was said to be securing rights-of-way from Coleman, Tex., south to Brady, about 45 miles, has been incorporated in Texas with $500,000 capital and headquarters at Coleman. The plans call for a line from Coleman south to San Antonio, about 175 miles. The directors include: H. N. Beakley, J. A. S. Miller, H. R. Starkwater, J. E. Roogostock and R. A. Lane.

CYNTHIANA & PARIS.—Organized to build from Cynthiana, Ky., south via Lair to Paris, 14 miles. There will be several small bridges and a 1,200-ft. crossing of the South Licking river. R. H. Rees, Cynthiana, is engineer in charge; W. H. Lail, Cynthiana; F. L. Fuller, New York, and R. W. Day, Scranton, Pa., are said to be interested.

DES CHUTES RAILROAD.—See Oregon Trunk Line.

GALVESTON-HOUSTON (ELECTRIC).—This company is said to have given a $5,000,000 mortgage to the City Trust Co., Boston, Mass., to secure funds for the construction of the line from Houston, Tex., southeast to Galveston, 51 miles. The company is backed by the Stone-Webster syndicate, Boston.

KANSAS NORTHWESTERN.—Contract is said to have been let to the Electric Traction Construction Co. to build this line. The first section to be built will be from Great Bend, Kan., southeast to Calista, about 70 miles. The plans include an extension from Calista east to Wichita or south to Oklahoma City, Okla. On the northern end the line is to be eventually extended northwest to Benkelman, Neb., in all about 330 miles. W. R. Crompton, Great Bend, may be addressed. (Dec. 10, p. 1167.)

METROPOLITAN STEAM & ELECTRIC RAILWAY.—This company, which was recently organized under the laws of Delaware, with headquarters at San Antonio, Tex., to build a system of electric interurban lines in south Texas, has completed surveys between San Antonio, Tex., and New Braunsfels, 30 miles. Surveys are now being made for other lines. It is said that the project has been financed and that construction work will be started soon. The first section to be built will be from San Antonio northeast to New Braunfels, which will be continued to Austin, about 85 miles. A line is also to be built from New Braunfels east via Seguin to Gonzales, about 60 miles. The company proposes to eventually extend this line to Houston. E. L. Squire, Wilmington, Del.; J. C. Marmion, San Antonio, and M. Kauffman, Yorktown, are stockholders.

NORTHERN ELECTRIC.—See Scranton & Binghamton.

NORTHERN PACIFIC.—The Toppenish, Simcoe & Western is said to have surveys made for the line from Toppenish, Wash., southwest to Goldendale, and contracts are let for work on the first 17 miles. The line is eventually to have a total length of about 90 miles. (Dec. 24, p. 1260.)

OAKLAND & ANTIOCH (ELECTRIC).—Work will be started at once, it is said, from Oakland, Cal., northeast via Berkeley, Walnut Creek and Concord to Bay Point, 34 miles. H. A. Mitchell, president, 347 Grant avenue, San Francisco.

OKLAHOMA CITY & FORT SMITH TRACTION.—Incorporated in Oklahoma, with $100,000 capital, to build about 200 miles of line. The projected route is from Oklahoma county, Okla., east to Fort Smith, Ark. The directors include: B. S. Bath, P. M. Mowry, F. M. Wood, A. M. Gaston, G. L. Wood and J. Wils, all of Oklahoma City.

OREGON RAILROAD & NAVIGATION CO.—According to press reports $700,000 has been appropriated to build a cut-off between Stanfield and Coyote in Oregon. It is said that improvements are also to be made on the road between Pendleton and Yoakum. (Jan. 14, p. 114.)

OREGON TRUNK LINE.—According to press reports the Hill and the Harriman interests have reached an agreement regarding rights-of-way from the Columbia river south through the Des Chutes valley into central Oregon. The Des Chutes Railroad, which is being built by the Harriman interests, will be built along the east side of the Des Chutes river, and the Oregon Trunk, under construction by the Hill interests, will be built along the west side, and each line may use the right-of-way of the other over certain portions of the route. (Jan. 21, p. 164.)

OSAGE WESTERN.—An officer writes that grading will be started about February 1 on a line from Vinita, Okla., west via Nowata, Bartlesville, Pawhuska, Fairfax and Bliss to Billings, Mont., about 178 miles. The line will have 0.6 per cent. grades, 3 deg. of curvature, and is to be laid with 70-lb. rail. A bridge is to be put up over the Arkansas river, also another over the Verdigris river. A roundhouse will be built at Vinita and another at Enid. The Overland Construction Co., Fairfax, are the contractors. The general offices of the company are at Vinita. R. H. Hoss, president, Fairfax; E. J. Noonan, chief engineer, Vinita. (See Osage & Western, Jan. 7, p. 69.)

PAN-AMERICAN.—This company has applied to the Guatemalan government for a concession to build a short line from the Suchiate river to Caballo-Blanco. Work on the international bridge over the Suchiate river is to be pushed, and it is expected to have it in operation by April 1. It is said that the company is planning to build several branch lines in the state of Chiapas, Mex.

PINE PASS RAILWAY.—Application has been made to the Dominion parliament for incorporation to build from Edmonton, Alb., northwesterly to the confluence of the McLeod and the Athabasca rivers, thence via Pouce Coupe Prairie, thence southwesterly to Fort George, on the Fraser river, B. C. The capital of the company is to be $1,000,000, and the headquarters will be at Edmonton. The provisional directors include: M. Kimpe, J. Smith, T. W. Lines, A. R. Chisholm and B. J. Saunders, all of Edmonton.

PORTLAND, EUGENE & EASTERN (ELECTRIC).—This company is planning to build 40 miles of line east to the McKenzie river timber district.

PRAIRIE FARM & SOUTHWESTERN.—Incorporated in Wisconsin to build from Prairie Farm, Wis., southwest to St. Paul, Minn., and Minneapolis. G. E. Scott, president.

QUEBEC CENTRAL.—A consular report says that the 30-mile extension of this road from St. George, Beauce, Quebec, to St. Justine, Dorchester county, has been opened for traffic. (Jan. 7, p. 69.)

REID-NEWFOUNDLAND.—According to press reports a contract has been entered into between this company and the Newfoundland government for the construction of five branch lines, in all about 300 miles. The lines are to be built from Shoal Harbor to Bonavista bay, 75 miles; Broad cove to Heart's Content and Grete's cove, 62 miles; Ransford bridge to Trepassy, 70 miles; Country Chance to Fortune bay, 48 miles, and from Bay of Islands to Bonne bay, 42 miles.

ROGUE RIVER VALLEY.—This company is said to have plans made for building an extension, from Jacksonville, Ore., southwest to Ruch, nine miles.

SCRANTON & BINGHAMTON TRACTION CO.—Application will

be made for a charter to operate a line from Binghamton, N. Y., south to Scranton, Pa., 62 miles. The Northern Electric, which now operates about 19 miles between these two places, it is understood, will be acquired and form part of the through line. J. K. Griffiths and C. H. Campbell are said to be interested. George R. Bedford, Wilkesbarre, is solicitor for the company.

Shawnee (Electric).—An officer is quoted as saying that work is to be started at once on this line. The projected route is from Shawnee, Okla., northeast to Muskogee, thence west via Oklahoma City to El Reno. It is expected that the section from Oklahoma City to Shawnee will be in operation by September of this year. A. Hardgrave is said to be general manager at Shawnee.

Stockton Terminal & Eastern.—Right-of-way is said to have been secured, and work is now under way, from Stockton, Cal., northeast via Linden and Bellota to Jenny Lind, 28 miles. M. J. Gardner, president; J. E. Adams, manager, Stockton.

Texas Roads.—According to press reports from Pecos, Tex., the construction of a line from Pecos southwest via Saragosa, Balmorhea and the Toyah valley to the Davis mountains, about 60 miles, is assured. W. L. Carwile, Dallas, Tex., and C. W. Swenson are said to be interested.

Texas Roads (Electric).—A system of electric lines is to be built out of San Benito, Tex., aggregating about 30 miles, connecting that place with several points in the lower Rio Grande valley. Preliminary surveys for the main line from San Benito south to the Rio Grande, about 10 miles, have been made. Bonuses for about $100,000 have been pledged to aid the project. S. A. Robertson, representing a syndicate of St. Louis, Mo., and Pine Bluff, Ark., capitalists, is interested.

Surveys are now being made for a line from Realitos, Tex., on the National Railways of Mexico southeast to Falfurrias, thence northeast via Kingsville to Corpus Christi, about 85 miles. It is proposed to use gasolene motor cars and at a later time electricity may be used as the motive power. Burton & Danforth, San Antonio, who own large tracts of land in that section, are said to be back of the project.

Toppenish, Simcoe & Western.—See Northern Pacific.

Tri-City & Northwestern.—New surveys are said to be under way for a line from Rapids City, Ill., southwest via Hampton to Watertown. The company is said to have options on a right-of-way from Albany southwest to Watertown. W. Treichler, chief engineer, Rapids City.

Trinity Valley & Northern.—See an item regarding this company under Railway Financial News.

Union Pacific.—According to press reports this company has filed maps covering the route of a proposed extension of the branch now ending at Northport, Neb. The route from Northport is west through Nebraska, entering Wyoming south of the North Platte river, and passes about nine miles south of Wheatland and 85 miles north of Cheyenne, thence west to a connection with the main line at Medicine Bow, Wyo. At Black Hills a series of tunnels are to be pierced, one of which is to be about 15,000 ft. long. The branch to Northport and the proposed extension west are to form part of a new main line. The company has for a long time had under consideration the building of this cut-off, which will not only reduce its main line mileage, but will enable it to avoid some steep grades. It is understood that the line will be 40 miles shorter than the existing line and will save a climb of about 1,000 ft. The construction of the line has not yet been authorized.

Vera Cruz & Isthmus.—A consular report says that work is now under way on a 44-mile branch from Rives, Vera Cruz, on the main line, north to San Andres, Tuxtla, crossing the San Juan river at Cuatotolapam. A 16-mile branch is being built from the main line at Brisbin, about five miles south of Los Naranjos, to Cerro Colorado, on the Papaloapam river. This branch is to be extended to Cosamaloapam, 28 miles from the main line. Large forces of men are now at work on both lines, and it is expected to finish the line to the San Juan river by March, 1910, and the other branch about the same time. (Dec. 3, p. 1109.)

Railway Financial News.

Atlanta & West Point.—Stockholders have voted to authorize an increase in the capital stock from $1,232,200 to $2,500,000. The new stock is to be offered to shareholders at par and the proceeds of the sale will be used to retire $1,232,200 6 per cent. debenture certificates.

Atlantic Coast Line.—The New York Stock Exchange has listed $1,000,000 addition first consolidated mortgage 4 per cent, bonds of 1902-1952 and has authorized the listing of $17,453,700 additional common stock on notice of exchange for 4 per cent. convertible bonds. The proceeds of the $1,000,000 bonds listed have been used as follows: For rolling stock, $470,000; for new terminals, real estate, shops and double-track, $529,000; to retire certificates of indebtedness, $1,450.

Stockholders of the Winston-Salem Southbound are to vote February 1 on the question of authorizing a mortgage securing $5,000,000 bonds. The bonds, it is said, are to be guaranteed jointly by the Atlantic Coast Line and the Norfolk & Western. (Aug. 6, p. 259.)

Beaumont & Great Northern.—The company has filed a mortgage securing $1,000,000 5 per cent. bonds of July 1, 1909-1939. The bonds are secured by a mortgage on the road at the rate of $40,000 per mile of line. The road runs from Trinity, Tex., to Livingston, 33 miles.

Boston & Maine.—The $569,900 common stock sold at auction on January 19 was bid in by Frank Seabury & Bro. at 143½. It is said that this stock was bought in the interests of the Boston Railroad Holding Co.

Boston & Northern.—See Massachusetts Electric.

Boston Railroad Holding Co.—See Boston & Maine.

Canadian Northern.—Wm. A. Read & Co., New York, and the Dominion Securities Corporation, Toronto, Canada, have bought and resold a new issue of $500,000 imperial rolling stock equipment 4½ per cent. bonds, series U, dated November 1, 1910, and due $50,000 annually to 1919.

Chicago & Southern Traction.—A bill has been filed in the circuit court asking for the appointment of a receiver. The company has 71 miles of track, its main line running from Chicago to Kankakee, Mich. There are now outstanding $2,500,000 bonds and an equal amount of stock.

Chicago, Rock Island & Pacific.—The $3,500,000 first and refunding mortgage 4 per cent. bonds taken by Speyer Brothers, London, were offered to the public at 95 and were over-subscribed for, it is said.

Detroit, Toledo & Ironton.—The general lien and divisional first mortgage 4 per cent. bondholders' committee, Otto T. Bannard, chairman, says that more than 85 per cent. of these bonds have been deposited with it, and the time for depositing bonds has been extended to January 21, 1910.

Kansas City Southern.—Sutro Brothers & Co., New York, are offering a block of Kansas City Southern refunding and improvement mortgage 5 per cent. bonds of 1909-1950 at 103, yielding 4.85 per cent. on the investment. The proceeds from the sale of these bonds was applied in part to the payment of $5,100,000 collateral notes and the balance is being spent for reduction of grades, additional terminal facilities, ballasting, etc.

Lake Shore & Michigan Southern.—See New York, Chicago & St. Louis.

Massachusetts Electric.—Wm. A. Read & Co., New York, are offering $3,700,000 of a new issue of collateral trust 4½ per cent. notes of the Massachusetts Electric Companies at 97⅝, to yield 5¼ per cent. The new notes are issued to fund $3,500,000 4½ per cent. notes maturing July 1, 1910. They will be the only funded debt of the company and are secured by deposit of stocks of the Boston & Northern Street Railway or the Old Colony Street Railway of a par value at least 25 per cent. in excess of the total of the outstanding notes. Both the Boston & Northern and the Old Colony

are paying 6 per cent. on their preferred and 5 per cent. on their common stocks. The Boston & Northern and the Old Colony operate the electric railways in the north and south, respectively, of Boston, and they control about 900 miles of electric railways in eastern Massachusetts.

MISSOURI PACIFIC.—An officer says that nearly all of the $29,806,000 5 per cent. first and refunding convertible bonds offered to stockholders at 95 have been subscribed for, and that Kuhn, Loeb & Co., New York, who underwrote the issue, will have to take few, if any, of these bonds.

NEW ORLEANS, MOBILE & CHICAGO.—The following have been elected directors of this company, which took over the property of the Mobile, Jackson & Kansas City: C. K. Beekman, L. S. Berg, Brayton Ives, G. R. Sheldon, F. E. Fried, R. W. K. Anderson, John McLeod, R. B. Scandrett, W. C. Sproul, S. Wexler and Alexander McDonald.

NEW YORK CENTRAL & HUDSON RIVER.—W. K. Vanderbilt, Jr., and L. C. Ledyard have been elected directors, succeeding H. McK. Twombly and D. O. Mills, both deceased.

NEW YORK, CHICAGO & ST. LOUIS.—Directors have declared an initial dividend of 3 per cent. on the $14,000,000 common stock. The Lake Shore & Michigan Southern owns $6,240,000 of this common stock.

W. H. Newman and L. C. Ledyard have been elected directors, succeeding H. McK. Twombly and D. W. James, both deceased.

NORFOLK & WESTERN.—The directors have voted to declare dividends quarterly instead of semi-annually, as has been the practice heretofore.

See Atlantic Coast Line.

NORTHERN CENTRAL.—A committee consisting of Michael Jenkins, chairman; Harry Walters, Norman James, A. L. Snowden, Samuel Rea and H. Tatnall has been appointed by the directors to consider a more permanent and remunerative operating arrangement with the Pennsylvania Railroad. The Pennsylvania owned on January 1, 1909, $10,577,200 out of a total of $19,342,569 stock of the Northern Central. Stockholders now receive 8 per cent. annual dividends.

OLD COLONY.—See Massachusetts Electric.

OREGON RAILROAD & NAVIGATION CO.—Otto H. Kahn, Mortimer L. Schiff, William G. Rockefeller and R. L. Gerry were elected directors, and Otto H. Kahn, Mortimer L. Schiff, H. C. Frick, William Rockefeller and William G. Rockefeller were elected members of the executive committee, the number of which is increased from five to seven.

PAN-AMERICAN CO.—George D. Cook & Co., New York, are offering the unsold portion of $300,000 6 per cent. collateral trust notes of October 1, 1909-1914, at 97½, yielding about 6.63 per cent. The total outstanding issue of these notes amounts to $1,600,000. The company, incorporated in Maine in 1909, owns $9,600,000 of the total $10,000,000 stock of the Pan-American Railroad. The Pan-American Railroad operates a line between San Geronimo and the border of Guatemala under a 99-year concession from the Mexican government.

PENNSYLVANIA COMPANY.—Directors have declared a dividend of $16.67 a share, payable in stock of the company to represent a portion of surplus income heretofore spent for betterments and capital expenditures. All the $60,000,000 capital of the Pennsylvania Co. is owned by the Pennsylvania Railroad, and the stock dividend amounts to about $20,000,000.

PENNSYLVANIA RAILROAD.—See Northern Central and Pennsylvania Company.

PITTSBURGH, CINCINNATI, CHICAGO & ST. LOUIS.—Directors have authorized a stock allotment of 12½ per cent. at par to stock of record Feb. 5.

QUEBEC & LAKE ST. JOHN.—See Canadian Northern.

SOUTHERN INDIANA.—An order of the court has been made directing the receiver to pay the instalment of interest which was due February 1, 1909, together with 5 per cent. interest on the interest instalment on the first mortgage 4 per cent. bonds. There were outstanding at last accounts $7,537,000 of these bonds, of which up to July, 1909, there had been deposited with the protective committee, A. G. Hodenpyl, chairman, $6,813,000.

SOUTHERN RAILWAY.—Kissel, Kinnicutt & Co., New York, are offering $500,000 of the new issue of three-year 5 per cent. notes of the Southern Railway dated February 1, 1910, due 1913. This is part of the authorized issue of $10,000,000, of which the total amount was recently sold by the railway to provide for the retirement of $15,000,000 5 per cent. notes maturing February 1, 1910, of which $5,000,000 had already been bought by the company. The offering price is 98¾, yielding about 5.45 per cent.

TRINITY VALLEY & NORTHERN.—A press despatch says that the stockholders have authorized an issue of $150,000 bonds. The company has 10 miles of line in operation from Dayton, Tex., on the Texas & New Orleans, to Fonts, and is authorized to build from Fonts to Cleveland.

UNDERGROUND ELECTRIC OF LONDON.—Bills are to be submitted to the British parliament providing:

(1) For the amalgamation of the Baker Street & Waterloo; Charing Cross, Euston & Hampstead, and Great Northern, Piccadilly & Brompton from July 1, 1910; (2) for the change of name of the Great Northern Company to the London Electric Railway Company; (3) for the increase of the capital by £7,195,000 ($35,975,000) to £12,600,000 ($63,000,000), divided into £3,150,000 ($15,750,000) 4 per cent. preference stock (dividend contingent on profits of each half-year) and £9,450,000 ($47,250,000) in ordinary £10 ($50) shares (with power to divide into preferred and deferred half-shares); (4) for an increase in the authorized amount of 4 per cent. debenture stock to £4,200,000 ($21,000,000); (5) for the termination of the guarantee (Act 1908) by the Underground Railways Company of London on shares and stock of the Brompton company; (6) for the conversion of each Brompton preference share into £10 ($50) preference stock and of every £100 ($500) Brompton ordinary shares into £17 12s. 4½d. preference stock ($88.09) and £82 7s. 7½d. ($412) ordinary shares; (7) for the exchange of Baker Street preference and "A" ordinary shares (held by public) into preference stock in the proportions of 100 and 75 per cent. respectively; Baker Street "B" ordinary shares (held by Underground Company) and Charing Cross shares to be treated in like manner to Brompton ordinary shares.

Metropolitan District Railway.—For the creation of £187,500 ($937,500) additional 4 per cent. guaranteed stock ranking *pari passu* with the existing stock, and carrying interest from July 1, 1910. Of this amount £184,375 ($921,875) is to be used in paying £14 15s. ($73.75) in new stock for the arrears on the existing stock and £2,058 ($10,290) is to be given for arrears on some of the Bow & Whitechapel stock. In addition to the above payments in stock, 10s. ($2.50) is to be paid in cash on August 15, 1910; February 15, 1911; August 15, 1911, and February 15, 1912. The maximum dividend on the 5 per cent. first preference stock is to be reduced to 4½ per cent.

UNION PACIFIC.—The *Boston News Bureau* says: "Well posted financial authorities in New York are advised that Union Pacific has recently acquired between $16,000,000 and $17,000,000 additional Southern Pacific common or enough to give the Union Pacific 51 per cent. of Southern Pacific stock. Union Pacific has owned for some years about 45 per cent. of Southern Pacific's combined common and preferred stocks. The story has this element of plausibility, that the legislation which President Taft has recommended provides that where a road already owns 51 per cent. of the stock of another company it may acquire the balance. Obviously, unless Union Pacific moves quickly, it must be forever debarred from securing absolute control of Southern Pacific."

WINSTON-SALEM SOUTHBOUND.—See Atlantic Coast Line.

The South Australian Royal Commission on Eyre's Peninsular Railways recommends, in addition to the extension from Yeelanna, South Australia, to Minnipa Hill, that a railway with 3 ft. 6 in. gage be built from Cummings railway station to a point northeast of Drake's Peak, a distance of 78 miles. The estimated cost, not including ballast and rolling stock, and providing that second-hand 41-lb. rails are used, is $970,000.

Supply Trade Section.

The Buda Co., Chicago, announces the election of L. M. Viles as vice-president and treasurer in charge of manufacturing, and Wm. P. Hunt, Jr., as vice-president and secretary in charge of sales.

The American Car & Foundry Co. plans to build an addition to its present steel coach plant at St. Charles, Mo., which will be 120 ft. wide and 1,800 ft. long. A new power house has been built and electric power is to be installed.

J. E. Buker, superintendent car department of the Illinois Central, has been elected first vice-president of the Chicago Car Heating Company, Chicago, with headquarters at the Railway Exchange building, effective February 1.

I. W. McConnell, recently a supervising engineer, U. S. Reclamation Service, and also identified with the Gunnison tunnel, has joined the staff of hydraulic and irrigation engineers of J. G. White & Company, Inc., New York.

The American Automatic Railway Brake Co., Baker City, Ore., has been incorporated with a capital stock of $500,000 to manufacture an automatic brake which applies the air to the whole train when any car leaves the track. The incorporators are F. W. Eppinger, H. A. Mitchell and E. B. McDaniels.

The Automatic Steel Grain Door Co., Wichita, Kan., advises that communications will be welcomed from firms equipped for the manufacture of all-steel non-destructible grain doors. Delivery is desired on 2,000 of these doors at the earliest possible date, and a permanent contract for future orders will be made.

A. D. McAdam, formerly vice-president of the Damascus Brake-Beam Co., Cleveland, Ohio, has resigned and has been elected vice-president of the St. Louis Surfacer & Paint Co., St. Louis, Mo., with headquarters at 1101 Fisher building, Chicago. Mr. McAdam was for several years connected with the American Car & Foundry Co. and the Michigan Malleable Iron Co., Detroit, Mich.

Leroy M. Harvey, sales manager of the Milwaukee district office of the Allis-Chalmers Co., Detroit, Mich., died January 19, at Augusta, Ga., where he had gone for his health. Mr. Harvey was about 37 years old. He was born in Oak Park, Ill., graduated from the University of Michigan in 1898, and was connected with the Westinghouse Electric Co., Siemens & Halske, and the Northern Electric Manufacturing Co. before entering the sales department of the Allis-Chalmers Co.

Fayette Brown, president of the Brown Hoisting Machine Co., Cleveland, Ohio, died at his home in Cleveland January 20. Mr. Brown had been connected with the iron and machinery trade since the close of the civil war, in which he served as paymaster for the Union army. In addition to the machinery company of which he was president, he was connected with the Stewart Iron Co., Ltd., the Union Steel Screw Co., the National Chemical Co., the G. H. Kuhlman Car Co. and several Cleveland banks.

F. A. Hall, who has been for the past 12 years manager of the chain block and hoist department of the Yale & Towne Manufacturing Co., New York, has resigned to accept an election as vice-president and treasurer of the Cameron Engineering Co., Brooklyn, N. Y. R. T. Hodgkins, who for the past several years has been Mr. Hall's chief assistant, will become manager of the chain block and hoist department. In his new connection, Mr. Hall expects to make a specialty of trolleys and appliances for overhead handling of materials, in which connection Yale & Towne blocks and hoists will be used.

U. S. Steel Corporation Earnings.

The United States Steel Corporation's report for the quarter ended December 31, 1909, shows total earnings of $40,971,309, after deducting all expenses incident to operations, including those for ordinary repairs and maintenance of plants and interest on bonds and fixed charges of subsidiary companies.

The above earnings compare with previous quarters as follows:

Quarter ended—	Total earnings.
September 30, 1909	$38,246,907
June 30, 1909	29,320,491
March 31, 1909	22,921,268
December 31, 1908	26,225,485
December 31, 1907	32,534,191
December 31, 1906	41,750,125
December 31, 1905	35,216,062
December 31, 1904	21,466,631
December 31, 1903	15,037,182
December 31, 1902	31,985,759

The unfilled orders on hand December 31, 1909, were 5,927,031 tons. This compares with previous quarters as follows, in tons:

Quarter ended—	Unfilled orders.
September 30, 1909	4,796,833
June 30, 1909	4,057,939
March 31, 1909	3,542,595
December 31, 1908	3,603,527
December 31, 1907	4,624,553
December 31, 1906	8,489,718
December 31, 1905	7,605,086
December 31, 1904	4,696,203
December 31, 1903	3,213,123
December 31, 1902	5,347,253

The balance of surplus of the United States Steel Corporation and subsidiary companies at the close of the quarter ended December 31, 1909, after charging off dividends on United States Steel stock, and amounts written off on account of capital expenditures for special funds, and for sundry adjustments and accounts, was $160,754,684.

The unfilled orders on hand on December 31, 1909, were 5,927,031 tons, an increase of 1,130,198 tons from September 30, 1909, and an increase of 2,323,504 tons from December 31, 1908.

Surplus for the year ended December 31, 1909, after all charges, appropriations, additions, betterments, etc., $27,339,430.—*Wall Street Journal.*

TRADE PUBLICATIONS.

Water Softening.—The L. M. Booth Co., New York, has just issued a circular describing its type "F" Booth water softener.

Car Roofing.—The H. W. Johns-Manville Co., New York, has just issued a small leaflet describing its J-M Car-Best-Us car roofing, which is a composite asbestos roofing made especially for railway cars.

Auto Car.—The Railway Auto Car Co., New York, has issued bulletin No. 101, descriptive of its steam motor car. Complete specifications of a 250-h.p. car are given, along with a halftone and line illustration.

Arctic Water Box.—The W. K. Kenly Co., First National Bank building, Chicago, has issued a four-page circular describing a cheap, durable and efficient water box for the use of section and gridge gangs, work trains and other laborers cut off from a water supply.

Roof Reinforcement.—The Brown Hoisting Machinery Co., Cleveland, Ohio, has just issued its 1910 Ferroinclave catalogue, descriptive of its sheet metal used as a reinforcement for concrete roofs, floors, side walls, partitions, stairs, coal bins, highway bridges, culverts, tanks, etc.

Conveyors-Elevator Buckets.—The Jeffrey Manufacturing Co., Columbus, Ohio, has just issued booklet No. 33 describing the Jeffrey wire cable conveyor, and booklet No. 34 describing Jeffrey standard elevator buckets. The illustrations show this equipment in both detail and installation illustrations.

Steam Traps-Fans.—The American Blower Co., Detroit, Mich., has issued bulletin No. 267 on Detroit steam traps; bulletin No. 263 on A B C steel plate fans, and bulletin No. 264 on A B C cone fans. These bulletins contain a large amount of valuable information on these subjects, including a large number of half-tone and line illustrations.

Gasolene Electric Generating Sets.—The General Electric Co., Schenectady, N. Y., has just issued its catalogue No. 4,707 descriptive of its gasolene electric generating sets for use in lighting plants where electric power is not otherwise provided.

The engines and generators comprising these sets are designed and built by the General Electric Co. for operation as complete units.

Dry Kilns.—The American Blower Co., Detroit, Mich., has just issued its catalogue No. 265 descriptive of A B C moist air dry kilns, including natural and forced circulation kilns of the progressive and apartment types. The catalogue contains a large amount of information which is both interesting and valuable. The illustrations show both plan and elevation illustrations of these kilns and also the miscellaneous equipment used in connection with them.

Mallet Locomotives.—The American Locomotive Co., New York, has just issued bulletin No. 1,000 on Mallet articulated compound locomotives, which shows a number of different designs built by this company for roads in this country and abroad. These designs, shown both in half-tone and line engravings, cover a wide range of weight and power and show the adaptability of this type to a great variety of service conditions. This is the first of a new series of bulletins, one of which will be issued each month, suitable for filing in a loose leaf cover.

Chloride Accumulators.—The Electric Storage Battery Co., Philadelphia, Pa., is distributing bulletin No. 118, which describes an installation of its chloride accumulators on the road of the Otsego & Herkimer Electric Railway, the batteries being for the regulation of an a.c.-d.c. system. This road operates heavy interurban cars with a constantly changing load on the generating apparatus, and the storage battery with its regulating apparatus is designed to relieve the generating machinery of the severe load fluctuations. The apparatus is particularly rugged and requires no expert attention to maintain its adjustment.

RAILWAY STRUCTURES.

AUGUSTA, GA.—The Augusta-Aiken Railway & Electric Co. expects to build passenger and freight terminals. Plans are not yet completed but a two-story building, 165 ft. x 80 ft., to cost $20,000, is being contemplated.

BARSTOW, N. MEX.—The Atchison, Topeka & Santa Fe has asked for bids on a new concrete passenger station of the Mission type.

BELOIT, KAN.—The Missouri Pacific, it is reported, is to replace the old passenger station now in service with a modern brick building.

BLUFFTON, IND.—The Bluffton, Geneva & Celina Traction Co. will build during the coming summer a power plant to use steam turbines as prime movers.

DALLAS, TEX.—The Dallas county commissioners have under consideration plans for a concrete viaduct to be used for highway and street railway traffic. The structure is to be built from Dallas, Tex., over the lowlands and the Trinity river, to Oak Cliff. The cost of the structure will be about $500,000.

ENID, OKLA.—See Osage Western under Railway Construction.

GRANT'S PASS, ORE.—The Southern Pacific will build a stone and tile passenger station and convert the present passenger station into a freight depot during the coming year.

MARYSVILLE, CAL.—The Southern Pacific is contemplating building a new passenger station.

NEW YORK.—It is understood that contracts have been let for a large (probably about 12 stories) commercial office building to be built over the Grand Central station property. It is probable that the structure will be a joint work of the New York, New Haven & Hartford and the New York Central & Hudson River.

TACOMA, WASH.—The Oregon & Washington, in addition to the tunnel, viaduct, passenger station, freight yards and repair shops previously mentioned, will, during 1910, dredge a 300-ft. waterway in the Middle channel of Puget Sound to facilitate deep sea shipping. Warehouses will be built along this channel.

VINITA, OKLA.—See Osage Western under Railway Construction.

Late News.

The items in this column were received after the classified departments were closed.

Directors of the Pittsburgh, Cincinnati, Chicago & St. Louis have authorized the issue of $4,000,000 series G consolidated 4 per cent. bonds.

Stockholders of the Atlantic Coast Line Co. have voted to issue 40 per cent. additional stock amounting to $5,040,000. (Dec. 31, p. 1320.)

The Union Station Co., of St. Paul, Minn., is said to be making plans for terminal improvements at St. Paul. The work will include a large union passenger station.

Thomas M. Osborne, one of the two Democratic members of the New York Upstate Public Service Commission, has resigned. John N. Carlisle, a Democrat, has been appointed to succeed Mr. Osborne.

According to press reports, the Union Pacific will soon have a force of about 2,000 men at work building a 40-mile extension to Fort Collins, Col., to complete a through line from Denver to Fort Collins of about 70 miles.

The Pennsylvania Equipment Co., Philadelphia, Pa., has ordered one 19-in. x 24-in. six-wheel switching locomotive from the Baldwin Locomotive Works and two 18-in. x 24-in. six-wheel switching locomotives from the American Locomotive Co.

At the thirtieth annual meeting of the Engineers' Society of Western Pennsylvania the following officers were elected for the ensuing year: President, E. K. Morse; vice-president, J. O. Handy; treasurer, A. N. Frost; directors, A. R. Raymer, Willis Whited.

The Gulf, Colorado & Santa Fe, it is said, will spend about $400,000 making improvements at Temple, Tex., and along the road to Brownwood. It is said an appropriation of $160,000 has been made to pay for widening the roadbed and raising the grade between Temple and Brownwood. The main track from Temple to Lampasas and north of Zephyr to Brownwood is to be rock ballasted at a cost of $240,000.

Residents of western Florida and southern Alabama are said to be back of the Gulf, De Funiak & Northern, which proposes to build from deepwater, on Choctawhatchee bay, Fla., north via De Funiak Springs, Glendale and Lakewood to Florala, Ala., about 54 miles. The plans include taking over a number of logging roads along the right-of-way to form part of the line. The offices of the company are at De Funiak Springs.

The Interstate Commerce Commission has issued an order to all carriers subject to the act warning them that a false entry as to date or otherwise on a bill of lading is a misdemeanor, and hereafter criminal prosecution of those responsible will be requested. The commission makes this order because of numerous cases brought to its attention of changes in dates of bills of lading made by carriers at request of shippers.

Press reports from Baltimore, Md., indicate that the addition of 250 locomotives, reconstruction of bridges, the building of a third track over the Alleghanies in order to facilitate the movement of trains and enlarged switching facilities is the promise of President Willard of the Baltimore & Ohio to the delegation from the Shippers' League of West Virginia, which called upon him on Wednesday relative to what they declared was inadequate service on the part of the company.

According to press reports, the Fox River Valley Railway is negotiating for a right-of-way to build an electric line from Milwaukee, Wis., north via Cedarburg, Plymouth, Elkhart, Kiel and Chilton, thence west to Stockbridge, and then north and west to Appleton. The plans call for a branch from Stockbridge south to Fond du Lac. There are also to be north and south branches from Appleton to Kaukauna, Neenah and Menasha, in all about 135 miles. Eastern capitalists are back of the project. J. A. Mesiroff, president of the Western Engineering & Construction Co., is said to be interested.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Chicago, Rock Island & Pacific is in the market for 25 Pacific and 50 consolidation locomotives.

The Carolina, Clinchfield & Ohio has ordered six Mallet locomotives from the Baldwin Locomotive Works.

The Norfolk & Western advised that it will acquire, during 1910, 40 freight and 10 passenger locomotives. Bids are now being asked.

The Oliver Iron Mining Co., Duluth, Minn., has ordered eight six-coupled switching locomotives from the Baldwin Locomotive Works.

The Delaware, Lackawanna & Western, reported in the *Railway Age Gazette* of December 17 as being in the market for 48 locomotives, has ordered this equipment from the American Locomotive Co.

The Buffalo & Susquehanna, as reported in the *Railway Age Gazette* of December 31, has ordered 10 consolidation locomotives from the American Locomotive Co.

General Dimensions.

Weight on drivers	167,000 lbs.
Total weight	185,000 lbs.
Cylinders	21 in. x 28 in.
Diameter of drivers	51 in.
Type of boiler	Wagon top
Working steam pressure	200 lbs.
Heating surface, tubes	2,497 sq. ft.
" " firebox	179 "
" " total	2,676 "
Tubes, number	375
" outside diameter	2 in.
" length	12 ft. 9⅞ in.
Firebox, type	Wide fire
" length	107 in.
" width	73¼ "
Grate area	54.4 sq. ft.
Tank capacity	6,000 gals.
Coal capacity	12 tons

Special Equipment.

Boiler lagging	Magnesia boiler
Brakes	New York Air Brake L. T. auto. control equip.
Brake-beam	2½ National hollow
Brake-shoes	Am. Brake-Shoe & Fdry Co.
Couplers	Sharon
Driving boxes	Steel, with grease cellars
Headlight	16 in. Dietz side door
Injector	No. 10 Simplex
Journal bearings	Magnus
Piston and valve rod packing	Jerome soft rod
Safety valve	Coale
Sanding devices	Leach
Sight-feed lubricators	Nathan bull's-eye
Springs	Union Spring & Mfg. Co.
Staying	Radial
Steam gages	Ashcroft
Tires	Midvale
Tubes	Charcoal
Valve gear	Walschaerts
Wheel centers	Cast steel

CAR BUILDING.

The Chesapeake & Ohio is asking prices on 1,500 freight cars.

The Detroit United Railway is reported in the market for 100 cars.

The Virginian has ordered 1,000 gondola cars from the Pressed Steel Car Co.

The Southern is said to be figuring on 2,600 car bodies to be placed on second-hand trucks.

The United Fruit Co., New York, has ordered 75 twenty-ton flat cars from the Middletown Car Co.

The Swift Refrigerator Transportation Co. has ordered from the Western Steel Car & Foundry Co. 100 thirty-ton produce cars.

The Missouri, Kansas & Texas is in the market for 50 caboose cars, 100 flat, 500 coal, 200 automobile, 300 furniture and 1,000 box cars.

The New York, Chicago & St. Louis is said to have ordered 10 passenger coaches and five baggage cars from the American Car & Foundry Co. This item is not confirmed.

The St. Louis, Brownsville & Mexico, reported in the *Railway Age Gazette* of January 7 as being in the market for from 30 to 50 forty-ton gondola cars, has ordered 40 Hart convertible cars from the American Car & Foundry Co.

MACHINERY AND TOOLS.

The Pittsburgh & Lake Erie is to install a turbine in its Pittsburgh power station.

The Pennsylvania is in the market for 6 radial drills and several other small lots of tools.

The Baldwin Locomotive Works have ordered three 70-ton traveling cranes from the Braun & Stewart Co., Philadelphia, Pa.

The Bethlehem Steel Co., South Bethlehem, Pa., has ordered, from the Crocker-Wheeler Co., Ampere, N. J., five compound-wound, interpole motors and 19 mill motors.

The Baltimore & Ohio has issued a list of machine tools which includes 7 planers, 34 lathes, 14 grinders, 6 punches and a number of shears, boring machines, driving wheel lathes, axle lathes and other tools.

The Tennessee Coal, Iron & Railroad Co., Bessemer, Ala., has ordered, from the Mesta Machine Co., Pittsburgh, Pa., one 40-in. x 60-in. four-valve engine. This is in addition to the machinery mentioned in the *Railway Age Gazette* of October 15.

IRON AND STEEL.

The Pennsylvania is taking prices on 400 tons of bridge steel.

The Central of Vermont has ordered 285 tons of bridge steel from the Phoenix Iron Co.

The Harriman Lines have ordered 3,500 tons of rails from the United States Steel Corporation.

The Missouri, Kansas & Texas has ordered 14,000 tons of rails from the United States Steel Corporation.

The New York, New Haven & Hartford is in the market for 400 tons of bridge steel for a Providence, R. I., bridge.

The Great Northern has ordered from the Wisconsin Bridge Co., Milwaukee, Wis., 360 tons of bridge steel for a draw span.

The American Car & Foundry Co. has ordered from the Kenwood Bridge Co., Chicago, 800 tons of structural steel for shops.

The American Rolling Mill Co., Middletown, Ohio, has ordered 4,000 tons of structural steel from the American Bridge Co.

The San Antonio & Great Northern is in the market for rails, ties and material for four 40-ft. bridges. J. H. Ransom, Davidson, Okla., is president and general manager.

The Davenport Locomotive Works, Davenport, Iowa, has ordered from the McClintic-Marshall Construction Co., Pittsburgh, Pa., 600 tons of structural steel for shop additions.

General Conditions in Steel.—The outlook of the steel industry, based upon the unfilled tonnage at the present time, is encouraging. It is said that eight of the large steel companies, including the U. S. Steel Corporation, Jones & Laughlin Steel Co., Bethlehem Steel Corporation, Republic Iron & Steel Co., Cambria Steel Co. and Lackawanna Steel Co. have booked at the present time a total of about 11,000,000 tons of unfilled orders. This large unfilled tonnage indicates that the first six months of this year will set a new high record in earnings, even though prices are lower than in 1907, as the cost of production is, in many instances, lower than it was then. The annual dividend increase from 3 per cent. to 5 per cent. by the Cambria Steel Co. was not generally expected.

FOREIGN RAILWAY NOTES.

A consular report says that an Ecuadoran concession has been granted to the Lignite Mining Company to build a short railway from the lignite mines or beds in the parish of San Antonio, province of Pichincha, to the city of Quito.

The line must be begun within one year from October 28, 1909, and finished within two years.

The Argentine Central Railway has been authorized to build a branch line from Carmen northeasterly 47 miles.

The railway extension bill of British South Africa provides for building eight new lines of railway. These projects include lines from Vryheid to Empangeni, and from Eshowe to Ginginhlovo. The last three named places are important towns in Zululand.

The rates on the various railways of Peru are in proportion to the cost of the road, which is high, as in the case of the Trans-Andean. As an example, the rates on the Oroya road—for 140 miles—horses $2.50, cattle $2 (if over five $1.50), groceries 25 cents per 100 lbs.

Definite progress is being made in the matter of railway building in Turkey in Asia. The Bagdad railway is to be extended from the present terminus at Eregli, and Aleppo is to be covered by the main line, instead of by a branch extension. The concession for the Tripoli-Homs line has been granted to the French company which already owns and operates railways from Beirut to Aleppo and Damascus, and work is to begin at once.

Recent Incorporation.

The John W. Rapp Co., New York, has recently been incorporated with a capital stock of $1,000,000, of which $800,000 is paid in. For a number of years past Mr. Rapp has carried on an extensive business as a patentee and manufacturer of art metal trim. Due to the increased demand for this production the reorganization of the company has been necessary. The factory is located at College Point, N. Y., and the sales department and show rooms at No. 1 Madison Avenue, New York, with branches in Boston, Denver, Duluth, Kansas City, Los Angeles, New Orleans, Philadelphia, Pittsburgh, San Francisco and Seattle. Following are the officers of the new company: John W. Rapp, president and treasurer; Charles J. Hale, vice-president; A. J. Connell, second vice-president; Carl Leonardi, secretary.

A New Berth Lamp.

The general adoption of the Tungsten bulb by railways, which is now playing an important part in electric car lighting, has brought about, to some extent, the necessity for new conditions in the design and construction of electric car-lighting fixtures. The Safety Car Heating and Lighting Co., New York, has introduced a new berth lamp, which, in addition to giving excellent results from the standpoint of illumination, permits the use of the standard G-18½ Tungsten bulb. The construction of the lamp is said to prevent the possibility of broken filaments caused by the passengers' usage of the fixture.

Fig. 1 shows a type of this new berth lamp designed for use in the corner formed by a partition between the section and the outside wall of the car; also a view showing the interior arrangement of the lamp. A standard electrolier socket is held by means of a spring clamp designed to give a firm support for the socket and still permit its easy removal. The electric bulb is of the standard G-18½ type, suspended in a vertical position, thus insuring maximum life for the Tungsten filament. This bulb is optically located in relation to the prismatic glass lens, so that the light is correctly distributed, directly or by reflection from the polished reflector back of the bulb. The front of the lamp is removably attached to the back frame and carries the prismatic lens, which is securely held by a ring. By removing the lock screw at the top of the fixture the front can readily be removed for replacing the electric bulb. To light or extinguish the lamp the passenger uses one of the buttons of the switch seen as a part of the lamp.

These fixtures are, of course, made for use on flat surfaces also, but the one illustrated is designed to avoid the necessity of cutting the woodwork of the car to apply the fixture. The following advantages are claimed for these berth lamp fixtures: Use of standard bulbs and sockets; minimum breakage of metallic filaments, since neither bulb nor any part of the fixture moves when the lamp is lighted or extinguished; ease of manipulation by passengers; use of properly designed glassware for correct distribution of light; compactness and

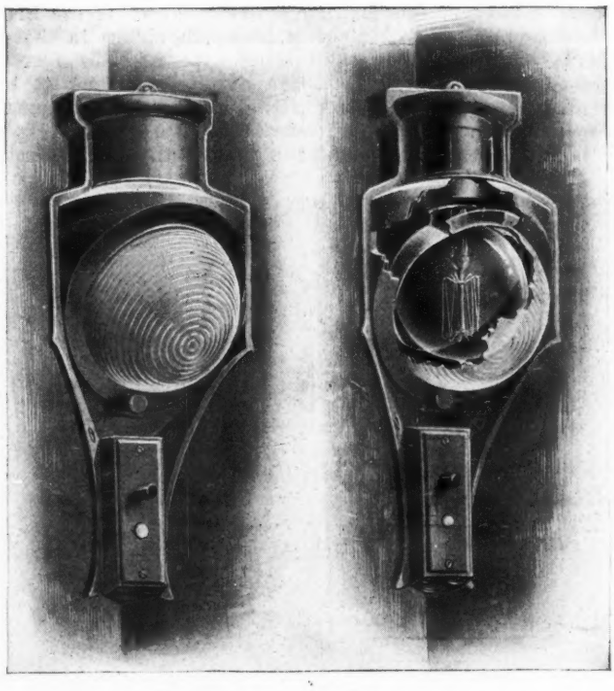
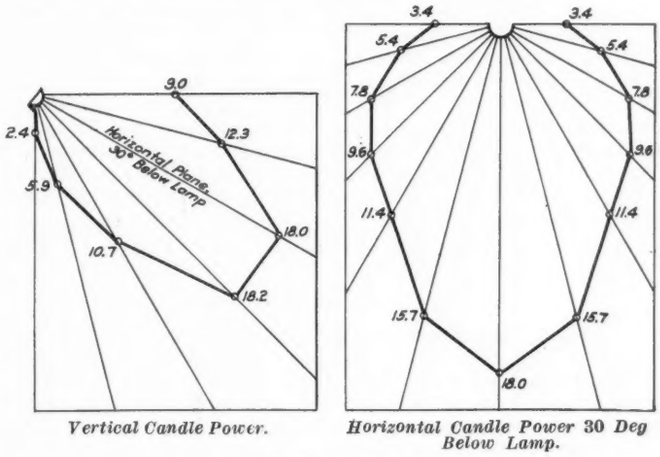


Fig. 1—Corner Berth Lamp.

economy of space both when lighted and when extinguished; use of most efficient type of electric lamp; ideal physiological effects, as the occupants of the opposite seat are subjected to no glare; the use of a prismatic diffuser entirely obviates any source of discomfort from glare as is the case where a plain bulb is placed directly in line of vision. This new lamp in-



Vertical Candle Power. *Horizontal Candle Power 30 Deg Below Lamp.*

Fig. 2—Photometric Curves.

sures, therefore, a soft mellow light, well distributed and restful to the eyes, as will be strongly emphasized by the accompanying photometric curves shown in Fig. 2.

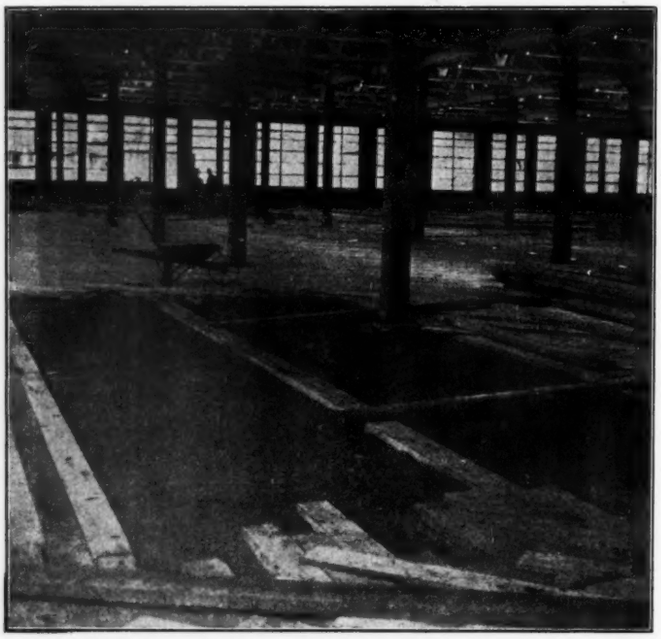
Factory Flooring.

For a number of years it has been the practice, where a wooden floor is required to be placed directly upon the ground, to omit floor sleepers and place the plank on from one inch to two inches of sand mixed with heavy coal tar. This method not only protects the planks against decay, but the creosote oil in the tar acts as a wood preservative.

The foundation has often been of concrete, but more usually

of cinders or broken stone or gravel, mixed with sufficient tar to make a composition that would compact well and provide a good, true and level surface for spreading the sand and tar. The mixture of sand and tar provides a perfect bedding for the planks. These planks are fastened together by the hard wood wearing surface which is laid at right angles or diagonally.

The adoption of this plan on the second floor of the Blake & Johnson factory at Waterville, Conn., is shown in the accompanying illustration. In this case the foundation of reinforced slab was in place and a surface on which to bed the planks was alone required. Sand alone would not suffice, as the vibration would cause it to shift. By mixing tar with the sand this danger was overcome and the protection afforded



Factory Flooring in Process of Construction.

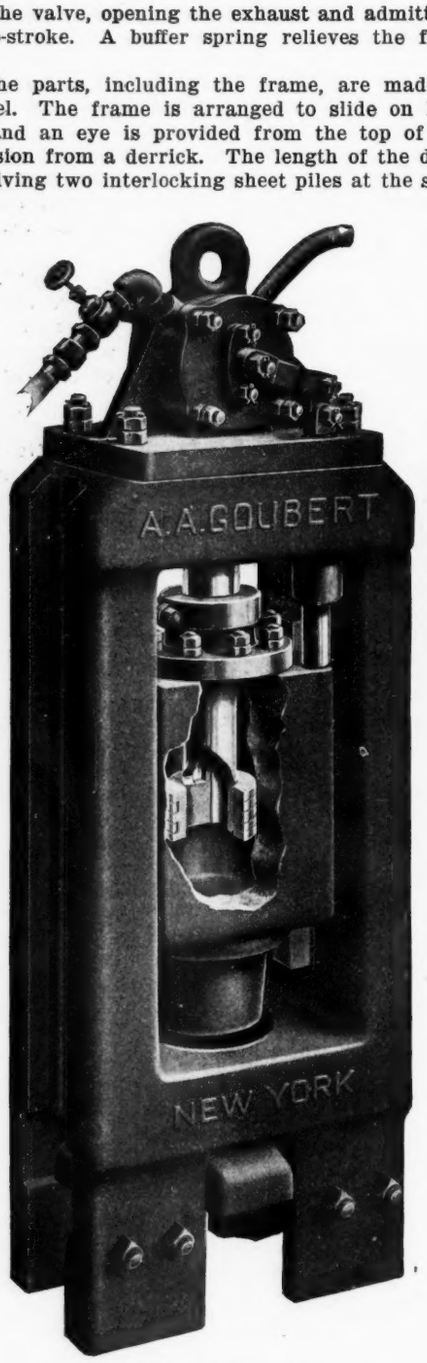
by creosote oils was obtained through the use of Barrett's sub-floor tar, about 50 gals. of which were mixed with each cubic yard of sand. The mixture was spread about 1⅛ in. thick, to be one inch when compact. While still warm and soft the planks were laid on it and tamped until the proper level and stability were obtained. After the 2-in. plank a ⅞-in. rough pine board was laid and then a surface of 1¼-in. square edged maple. It is expected that the planks in this floor will last as long as any other part of the building. Should the hardwood wearing surface wear through in places, repairs will be easily made. The sub-floor tar used in this connection is a special product of the Barrett Manufacturing Co., New York.

Goubert Pile Driving Hammer.

The illustration herewith shows a Goubert pile driving hammer. In this machine the heavy solid steel cylinder strikes the blow. It slides freely on guides, which are integral with the frame, and its mass is such as to absorb the effect of the percussion. Its lower, or pene end, strikes upon a loose anvil or steel dolly block on the top of the pile, and the pene is of such large area as not to be injuriously upset by the effect of repeated blows.

The piston and its rod are stationary and rigidly connected to the valve chest, which is securely bolted to the frame. Ports through the piston rod admit steam alternately above and below the piston, the admission of which is controlled by a rotary valve in the chest above the piston rod. The valve is actuated by a radial arm, to the end of which is hung a heavy plunger. The cylinder has no permanent connection with the valve gear. At the end of the up-stroke it strikes the plunger, rotating the valve and admitting steam under the piston. The cylinder is then propelled downward to strike the blow. The percussion causes the plunger to suddenly fall, reversing the valve, opening the exhaust and admitting steam for the up-stroke. A buffer spring relieves the fall of the plunger.

All of the parts, including the frame, are made of open hearth steel. The frame is arranged to slide on leaders, if required, and an eye is provided from the top of the chest for suspension from a derrick. The length of the dolly block permits driving two interlocking sheet piles at the same time,



Goubert Pile Driving Hammer.

and as it is made in the form of a cross, it is readily used for driving corner piles. Round piles from 9 in. to 20 in. may also be driven.

This hammer is manufactured by A. A. Goubert, New York.

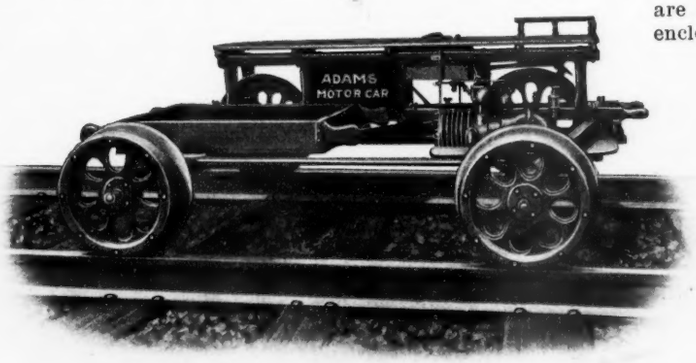
Plant of the Lackawanna Bridge Company, Buffalo, N. Y.

The initial plant of the Lackawanna Bridge Company at Buffalo, N. Y., was completed December 1. Most of the machinery has been installed and operations were begun in a portion of the plant on December 15, and it is now in full operation. The site, which is adjacent to the Lackawanna Steel Company's works and those of the New York State Steel Company, contains 23 acres, and is located on Abby street and the South Buffalo Railway, a switching and terminal road controlled by the Lackawanna Steel Company and which connects directly with all of the railways entering Buffalo from the east, south and west.

The new plant was projected and built by the Worden-Allen

Company interests in Milwaukee, of which B. L. Worden is president. He wished to establish a fabricating and distributing plant for the eastern markets and regarded Buffalo as an advantageous point for its location.

The main building, just completed, is 610 ft. long and 200 and 250 ft. wide, is of steel and brick construction with tile roof and is divided into sections, without partitions, comprising a machine shop, template shop, turntable shop, construction department and layout shop. All machinery is electrically operated by direct-connected motors, the company generating its own power. The crane equipment, which is operated the full length of the building on two main runways and one side bay and one yard runway, consists of six Pauling & Harnischfeger, Milwaukee, Wis., traveling cranes, one of 20



Adams Motor Inspection Car.

tons, two of 15 tons, one of 10 tons and two of five tons capacity, including the five-ton crane for the yard runway and also two wall jib cranes and two small gantry cranes in the machine shop. There are 12 Reamer gantrys of the Worden-Allen Company's make and 16 radial drills of Pawling & Harnischfeger's make.

The punch and shear equipment consists of 16 punches, two angle shears, one 8 in. x 8 in. x 1¼ in., and one 6 in. x 6 in. x 1 in., and two plate shears, one 60 in. x 1¼ in., and one 48 in. x 1 in. There are also two rotary planers, one 20-ft. plate planer and two bar-bending and straightening machines. The 18 compressed air riveting machines with which the plant is equipped, 12 of 70-ton and six of 50-ton capacity, were furnished by the Hanna Engineering Works, Chicago.

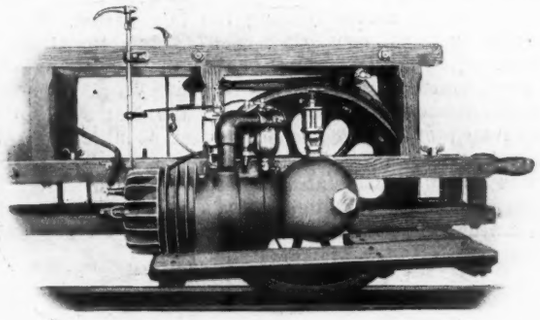
The equipment also includes one 1,500-lb. Lane steam hammer, one Bradley hammer, lathes, shapers, drill presses, rivet-making machinery, oil furnaces, etc. The power plant comprises a 500-h.p. Allis-Chalmers Corliss engine, a 240-volt Bullock generator, direct-connected; a Nordberg two-stage air compressor, cross compound 12 in. x 20 in. x 36 in.; two boilers and all the accessories of an up-to-date power plant.

The company has already booked and in work a number of important contracts. It will carry at its plant a stock of plates and shapes of about 5,000 tons. This carrying of warehouse stock of structural material is a new feature for the Buffalo district, as it has been heretofore supplied from Pittsburgh and Cleveland.

W. A. Hazard is manager of the plant and A. Freiburger, general superintendent. The officers of the company are: B. L. Worden, president; J. P. Nicholas, vice-president; F. H. Bottum, assistant secretary. Jason Paige is contracting engineer with offices at 50 Church street, New York. The general offices of the company are at 626-628 Fidelity building, Buffalo, N. Y.

Adams Motor Inspection Car.

The Adams inspection car is designed for the use of signalmen, linemen, lampmen, roadmasters and inspectors. The four-wheel standard, shown in the illustration, when equipped with the iron tray, weighs 270 lbs. and a similar car having three wheels weighs 245 lbs. This weight is well balanced so that the car can be readily handled by one man. The frame is of white ash rails, braced and bolted, the cross arms being iron bound. The gasolene motor is illustrated in the accompanying cut. It is a two-cycle, reversible, air-cooled motor, direct-connected to the rear wheel. It is equipped with dry cells, sight feed oil cups and Schebler carburetor and is controlled by a throttle lever, spark lever, and compression relief lever for starting and coasting. The cylinder head and crank case are ground, metal to metal, and all other working parts are enclosed to insure cleanliness. By locking the box containing the batteries, spark coil, switch and tools, the car is effectively protected against being started in the owner's absence. The builders can limit the speed to anything under 30 miles an hour without decreasing the power developed. It is said that 70 to 90 miles can be run on each gallon of gasolene.



Gasolene Motor for Adams Inspection Car.

The car is being placed on the market exclusively by Burton W. Mudge & Co., Chicago.

The Rowell-Potter Safety Stop.

The report of the Block Signal and Train Control Board of the Interstate Commerce Commission on this apparatus was briefly noticed in the *Railway Age Gazette*, of December 31, page 1302. Herewith we give the main parts of those paragraphs of the report which deal with the stopping apparatus proper.

The devices of the Rowell-Potter Safety Stop Company were installed in October, 1908, on 5 miles of the Chicago, Burlington & Quincy single-track line between Sugar Grove and Big Rock, Ill., and on 2 miles of double track east of Aurora. Two locomotives used in local freight service were fitted with the apparatus to apply the air-brakes. These engines were in regular service throughout the winter, and the inspector of the board observed the behavior of the apparatus in cold weather and at times when there was deep snow on and around the ground apparatus. The Rowell-Potter train stop is a mechanical trip. A bar lying parallel and close to one of the rails of the track is lifted a short distance above the rail, whenever the visual signal is set in the stop position; and this bar, coming in contact with an air-brake valve (suspended from the equalizer of one of the trucks of the tender) opens the valve and applies the brakes. Bars at the side of the track are provided in dupli-

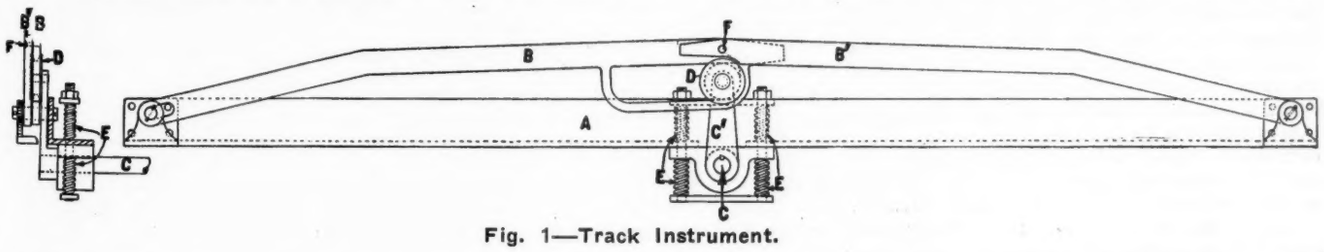


Fig. 1—Track Instrument.

cate at each signal location, the two being rigidly connected to each other in such a way that one bar must always be in engaging position (to stop a train) and the other depressed. One is 180 feet in advance of the other, and if the first one fails to go to the stop position behind a passing locomotive, the second one remains up and stops the train. Power to operate the stop as well as to operate the semaphore signals of the system is derived from the pressure of the wheels of passing trains on levers fixed close to the rails, these levers serving to wind up a coil spring. This power apparatus is one of the principal features of the Rowell-Potter system as presented. Track circuit control is provided as in ordinary automatic block signaling.

The first installation of the Rowell-Potter system was made in 1891 on the Boston, Revere Beach & Lynn. The second was made in 1893 on the Intramural Railway at the World's Fair, Chicago, there being 21 automatic block signals, all being equipped with automatic trip devices. This installation remained in service during the fair period. The third was made in 1893, consisting of 37 automatic signals and trip devices, on the Chicago & South Side Rapid Transit (elevated line), remaining in service several years. The fourth was made during 1894 and 1895 on the Metropolitan West Side Elevated of Chicago, consisting of 36 automatic signals and track trips, remaining in service several years. The fifth was an automatic interlocking plant at Hawley, Ill., at the crossing of the St. Louis, Peoria & Northern with the Peoria, Decatur & Evansville. The sixth was on the Chicago, Mil-

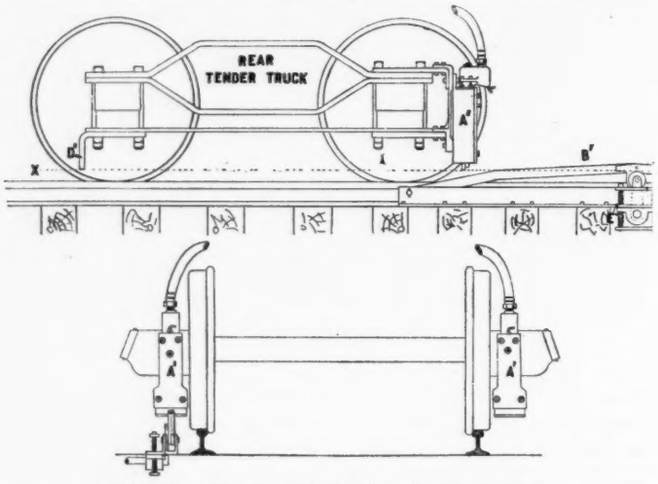


Fig. 2—Track and Engine Instruments.

waukee & St. Paul. * * * It remained in service from May to December, 1902.

Power-storing machine.—The arrangement of the bar, levers and storing machine is such that the passing of an engine with two cars will store sufficient power to operate the apparatus for the next train. The capacity of the springs is such that upon being completely wound up sufficient power is stored to operate the apparatus from thirteen to twenty-three times. A cut-out is provided in connection with the winding apparatus to throw it out of operation when the springs are fully wound. It is thrown in again when a certain predetermined amount of power has been used, both operations being automatic. A lock is provided to automatically lock the apparatus in the normal position (signals at stop) should the power become exhausted.

Track instruments.—The track instrument or trip for the engine valve consists of two iron bars lying parallel to the track rail near the ends of the track ties, being lapped and joined by a pivot at the center and fulcrumed at the other ends, being so connected by a rocker shaft and cranks to the power machine as to be raised into or lowered out of position to open an air-brake valve mounted on the locomotive-tender truck. The trips are in duplicate, the two being connected by rigid mechanical connections. A train upon approaching a clear signal finds the first trip lowered out of engaging position, and upon passing over it sets the signal to the stop position, which raises the rear trip and lowers the one in advance of the signal. Should the signal fail to go to the stop position the second trip would not be lowered, and not being lowered it would open the train valve. This feature thus provides for stopping the train in the event of the home signal sticking in the clear position.

Engine apparatus.—The air-brake valve is fastened to the axle box on the front end of the rear tender truck. Guards or scrapers are placed on the forward end of the forward tender truck and rear end of rear truck (D^1) to prevent any obstruction beside the trip striking the valve plunger. Whenever a trip is encountered in the raised or tripping position, it is first engaged and depressed by the scraper and restored by springs to its raised position in time to engage the engine valve.

The trip has an incline of 1 inch in 30 inches and the valve plunger, which moves vertically, is provided with a lock which is released by the raising of a second plunger placed directly back of the valve plunger. The two plungers are so arranged that when engaging the track trip the unlock plunger will be raised first, unlocking the valve plunger, allowing it to be raised. The valve upon being opened is

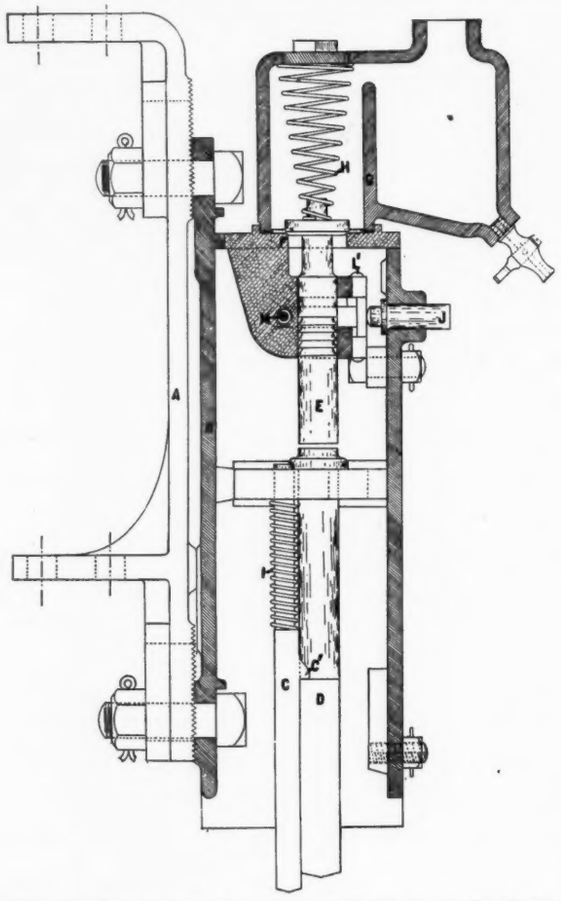


Fig. 3—Engine Instrument; side view, in Section.

locked in this position until released by a plunger. This release can be effected only by a man on the ground.

Tests.—The tests were continued through five months. During that period there were recorded 48,352 signal movements with 89 signal failures, and 31,013 automatic stop movements with 11 failures, showing one signal failure in 543 signal movements and one automatic stop failure in 2,820 movements. * * * A bald statement of the number of signal and stop movements per failure indicates a rather unsatisfactory showing, but an analysis of the results places the mechanisms in a more favorable light.

The report then goes on to explain and discuss in detail all faults of design and construction of apparatus or of management and operation, reaching conclusions favorable to the apparatus on all the principal points except as noted in the closing paragraphs (See below). In all cases of failure of the visual (semaphore) signal in the clear position the second track-trip was in position to stop the train. The general subject of train stops is then taken up as follows:

Mechanical-trip train stops of the ground type have been

used for some years and with a considerable measure of success on electric railways situated on elevated structures or in subways in Boston and New York, and more recently in Philadelphia, but so far as the board is aware no devices embodying the principal features of the Rowell-Potter system have had extended use under the conditions of steam surface railway operation. Hence there is very little precedent or data upon which to base comparisons, and it is, therefore, necessary to consider the system presented from the standpoint of the characteristics which it is believed any automatic train-control system should possess.

The art of automatic train control is, as compared with most other arts, new, and while the board has never adopted any definite statement of requisites to which an automatic train-control system should conform, it believes that there are certain desirable features which every such system should possess in order to meet fully the requirements of safety, of reliability, of flexibility and of economy of operation which the best railway practice would impose. Devices might operate satisfactorily in one situation under known and fixed conditions which would be quite unsuitable for other situations. Doubtless a considerable number of collisions that have occurred upon railways in this country could have been prevented by the use of an extremely simple form of mechanical trip. * * * To obtain the greatest possible benefit from its use, and in order to be wholly desirable, the board believes that any system of automatic train control should possess the following characteristics: (1) The apparatus should be so constructed that the removal or failure of any essential part would cause the display of the stop signal and the application of the train brakes. If electric circuits are employed they should be so designed that the occurrence of a break, cross or ground or a failure of the source of energy in any of the circuits would cause the display of the stop signal and the application of the train brakes.

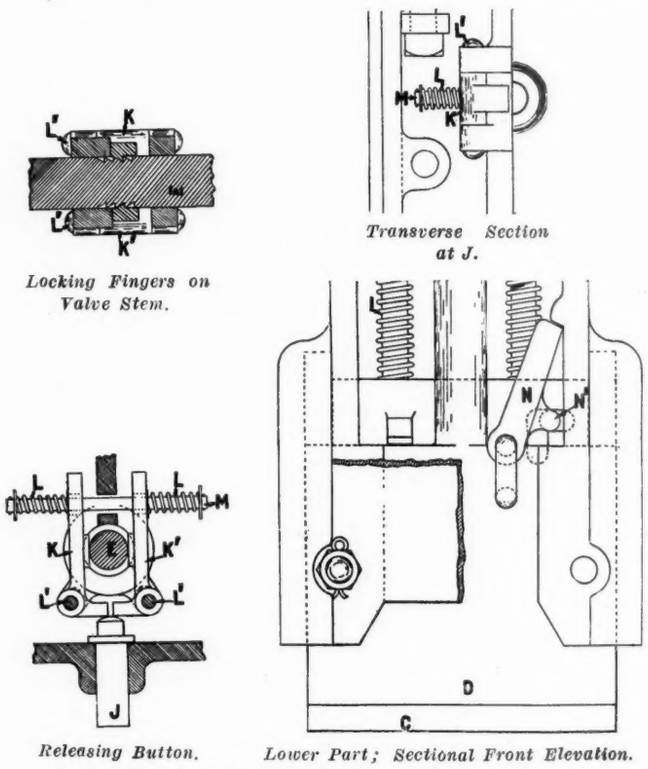


Fig. 4—Details of Engine Instrument.

(2) The apparatus should be so designed that it may be used upon the open roadway, on bridges or elevated structures, in tunnels or subways, and where either steam or electricity is used as the propelling power.

(3) The apparatus should be so constructed as to conform to recognized standards of clearance for rolling equipment and structures, so that those portions of the apparatus placed upon the roadway will not be subjected to damage by rolling stock or engines, nor those portions placed upon the vehicles be damaged by any structures permitted to exist upon the roadway; and at the same time all vehicle parts and roadway parts which may have to come into operative relation should be so designed that proper operative relation will be assured under all conditions of speed, weather, wear of track or vehicles, oscillation and shock.

(4) The system should operate under all weather conditions which permit the operation of trains.

(5) The system should be capable of control by the ordinary means used for indicating the condition of the block about to be entered, such as electric track circuit.

(6) The engine apparatus should be so constructed as to prevent release of brakes after an application has been made until the train has been brought to a stop, or the obstruction or other conditions which caused the application have been removed.

(7) The system should be so designed that should operating conditions require it speed control may be used; that is, provision should be made for a train to pass an automatic stop in tripping position without the application of the brakes, provided the speed is less than a predetermined number of miles per hour.

(8) The system should be so designed that when no cause for stopping a train exists, a definite and positive clear or proceed indication will be given at every point where a stop indication would be given or the brakes applied when adverse or dangerous conditions existed.

(9) The system should provide, at least for use under congested traffic, for a continuous display of indications rather than for their intermittent display at certain definite points, as of course is necessary with fixed signals.

It is possible that other conditions may develop as the result of the use of automatic train-control systems, which it will be found necessary to meet, and it is possible that experience will develop the necessity for a modification of some of the characteristics described.

Examination and study disclose the following facts in regard to the system when examined in the light of the desirable characteristics above referred to.

Characteristic No. 1.—It is doubtful if any form of mechanical trip device can completely possess this desirable characteristic. It is obvious that if the ground trip is broken off or removed it can not stop the train, and to this extent mechanical trip systems would fall within the category of what would be called in an electric system "open-circuit" devices. Nevertheless, it is believed that by proper design and construction, and especially by the duplicate principle here employed, mechanical trips can be made to operate with a very considerable degree of reliability, even under adverse weather conditions.

This system appears to possess the desirable features of characteristic No. 1 to a greater degree than any other mechanical trip examined by the board to date. The failures due to the valve closing after being opened are, it is believed, the most serious; and it must be said that the engine air valve used does not possess characteristic No. 1 to a proper degree. It is the opinion of the board that no valve should be used for this purpose except one in which the train-line pressure will tend to open it and hold it open. The electrical features of the test installation do not possess characteristic No. 1, in that the line circuits are improperly designed. This, of course, is not inherent in the system, as the arrangement of batteries and apparatus in the circuits could probably be changed to a satisfactory one without difficulty.

Characteristic No. 2.—The apparatus conforms to characteristic No. 2, though some changes would probably be necessary in the arrangement of the connections between the track and the power-storing machine if the system were to be used on elevated lines or in subways.

Characteristic No. 3.—Apparently the question of clearance has been well taken care of in the test installation. Modifications in clearance would undoubtedly have to be made to suit the requirements of special situations.

Characteristic No. 4.—Inspection reports show but one failure due to sleet or ice during the tests. The connections between the trips and the power machines were not housed in. It is probable that with proper housing of these connections and of the power-storing machines themselves failures from severe weather conditions would not occur.

Characteristic No. 5.—The system as installed takes full advantage of the use of the electric track circuit.

Characteristic No. 6.—With the apparatus arranged as shown it might be possible for a trainman to drop to the ground and release the engine air valve before the train had come to a full stop, yet the speed of the train would be so reduced that for all practical purposes the desired result would be obtained notwithstanding.

Characteristic No. 7.—The system as presented makes no provision for speed control, though it appears to be capable of having any one of several forms of speed-control devices applied to it to permit the train to pass a stop in tripping position without a brake application, provided the speed is reduced below a predetermined number of miles per hour.

Characteristic No. 8.—The system provides no indication upon the engine to denote that a train is passing a point at which a brake application might be made were the conditions favorable. While, as presented, it is intended to be used only in connection with a system of fixed signals, it is the opinion of the board that the giving of a definite and positive clear or proceed indication at every signaling point, when no cause exists for stopping the train, is a very desirable characteristic. In a cab-signal system unaccompanied by fixed signals the possession of this characteristic would be an absolute requisite.

Characteristic No. 9.—One of the most desirable objects which may be accomplished by the production of effects on the engine by signaling or controlling devices along the track is the production of a continuous effect rather than the mere display of an intermittent indication, such as is inherent with any system of fixed signals. The length of time any fixed signal is within view of the engineman of a moving train is comparatively short. He remains in his cab continuously while the engine is running, and any system which aims to produce effects upon the engine should, in order to be of maximum benefit, produce these effects continuously, or so long as the conditions which cause them exist. There is undoubtedly a large field for devices which exercise control or display indications upon the engine intermittently, but the value of such devices would undoubtedly be enhanced if the control could be exercised or the indications displayed continuously.

CONCLUSIONS.

Train-operated power-storing machines.—The board assumes that a sufficient number of these installations has not as yet been made to determine what their cost would be if the apparatus were manufactured in considerable quantity. The board is concerned with the element of cost only in so far as it has to do with the ability of railways to install appliances or systems for the promotion of safety in their operation. It is obvious that the first cost of installation of this system would be very considerable, but it is not known to what extent this cost would be offset by the diminished cost of operation. The board has no data as to the ultimate relative economy of this system as compared with any others.

Automatic block system.—As an automatic block-signal system the Rowell-Potter devices, aside from probable decreased cost of operation, cannot be said to possess exceptional merit. It is the opinion of the board that in any system of automatic block signaling without the use of automatic stops gravity is the only force permissible for restoring the signal to the stop position. This system requires the use of power from the coil springs to restore the signal to the stop position. While it is recognized that the air-brake will be applied by the train stop in the event of the signal sticking at clear, it is held that the system would be much more commendable if the power machine were used only for clearing the signal and if the signal were arranged to go to the stop position by gravity whenever the electrical controlling device becomes de-energized.

Mechanical-trip train stops.—The duplicate arrangement of two train stops so connected that one is always in the engaging position while the other is withdrawn is a very commendable feature for use with an automatic block system or wherever operating conditions permit its use. It is believed that the design of the trips is good in that they move vertically into tripping position and present an inclined surface to the engine valve, and in that their fin-like construction affords ample stiffness to resist impact and a minimum of resistance to movement through snow or sand. The introduction of springs in the connections used to move the stops into tripping position can only be considered as affording a desirable degree of safety when the springs are so designed, as those under consideration appear to be, that a breakage of the springs will not affect the movement of the trips sufficiently to prevent the engine valve being opened.

Engine air-brake valve.—The board's opinion is that the engine valve of the Rowell-Potter installation worked well in spite of, rather than because of, its design. It is theoretically unsound in that spring pressure and the train-line air pressure tend to hold it closed rather than to open it. There appears to be no reason why a valve of the same general design but constructed on correct principles should not work better.

The system as a whole.—As regards the system taken as a whole, the board concludes that if the faults herein mentioned were remedied, and it sees no reason why they should not be substantially overcome, and if the apparatus were well inspected and maintained, the system would be safe and reliable and its use would tend materially to promote safety of operation on a railway using it. As to its economy, there are not sufficient data from which to form a conclusion of any real value.

ILLUSTRATIONS.

Fig. 1 shows the track instrument. The main plate A is an angle bar bolted to the ties. Bar B has a loop at its inner end in which roll D is confined. E. E. are springs which hold C firmly against the base of A. The object of this arrangement is to provide a means of raising bars B B′ in the center to form an inclined plane and lower them to a level with the rail. The rotating of shaft C ninety degrees does this. Shaft C has on its outer end an arm to which the propelling power is attached. The object of springs E is to provide a flexible instrument, *i. e.*, a greater load than the sustaining power of springs E being placed upon bars B B′, springs E would be compressed and bars B B′ pressed down instead of being broken. Shaft C has a universal bearing at its outer end to permit of this. The loop on B for this installation was welded; some trouble was caused by poor welds. For permanent service bars B and B′ would be drop forged in solid metal and the character of steel specified.

Fig. 2 shows the brake-setting attachments of the engines and the track instruments in their relative positions. Brake-setting attachments A′ are bolted to the forward end of the rear tender truck, one on each side. D′ D′ are guards for A′. They are fastened to the forward end of the front truck and the rear end of the rear truck. The imaginary line, X X, is parallel to and 3½ inches above the rail.

Fig. 3 shows the engine instrument. In this C is the locking plunger which locks main plunger D in its normal position. C′ is a lug fast to C and resting on top of D. D is the main plunger. The valve casing, G, has two compartments. Air is admitted to the outer compartment and passes over a partition to get to the valve, which prevents moisture from getting to valve and freezing. J is the releasing button. K, K′ (Fig. 4) are locking fingers in the form of right-angle cranks pivoted at L′. LL are springs on M, whose strength is exerted to press KK′ together and cause them to bear on either side of E. M is a floating arbor for LL. N is locking dog on D, which locks D in its normal position. It has a lug N′, which extends into a right-angle slot in C. The top of slot bears upon the top of N′ and holds it in the locked position, as shown on Sheet 8.

Plunger C extends below D the proper distance, so that an incline of 1 in. in 30 in. will raise C a sufficient distance to cause the lower part of slot in C to press upward on N′ and rock N out from under the lug on B before coming in contact with D. D is then free and both C and D are forced upward. The travel of D forces E upward off its seat and allows the air to escape down through the machine. The object of allowing the air to blow down through the machine is to keep the machine clean. When E is forced upward KK′ being pressed inward by the pressure of springs LL catch in ratchet teeth on E and hold it up. To close this valve it is necessary to press button J, which rocks KK′ on their fulcrums. L′ disengages them from E and allows it to drop. The object of lock N on plunger D is to prevent the machine from being operated by anything except the instrument that was intended to operate it.